Operations & Maintenance Manual Update

Prepared for

Idaho Parks and Recreation

Heyburn State Park Wastewater Treatment Facility

April 2019

Operations & Maintenance Manual
Heyburn State Park Wastewater Treatment Facility

Headworks Building: 746 Chatcolet Road
Effluent Building: 748 Chatcolet Road
Irrigation Building: 5000 Hwy 5
Plummer, Idaho 83851

Incorporating the following systems:
Collection System
Treatment System
Storage Management System
Land Application System

Prepared for

Idaho Parks and Recreation
5657 Warmsprings Ave
Boise, Idaho 83716

April 2019

Prepared by

Zach Thompson, T-O Engineers, Inc.
Project Manager

T-O ENGINEERS
7950 N. Meadowlark Way, Suite A
Coeur d'Alene, ID 83815

Table of Contents

Table of Contents i
List of Tables iii
1. Introduction 1-1
Purpose 1-1
Use of the Manual 1-1
Responsible Charge Operators 1-1
Operator Daily Responsibilities 1-2
Operator Safety Procedures 1-3
2. System Design Information 2-1
Central Sewage Collection and Treatment System 2-1
Collection System 2-1
Treatment System 2-3
Storage Management System 2-4
Land Application System 2-4
Data Collection and Record Keeping Quality Assurance 2-4
3. Collection System 3-1
Overview 3-1
Design Data and Equipment Description 3-2
Operational Procedures 3-17
Instrumentation and Controls 3-18
Troubleshooting 3-19
4. Treatment System 4-1
Overview 4-1
Design Data and Equipment Description 4-2
Operational Procedures 4-8
Normal Operation 4-8
Reduced Operation No. 1: Treatment Pond 2 Off-Line 4-8
Reduced Operation No. 2: Treatment Pond 1 Off-Line 4-9
Instrumentation and Controls 4-9
Abbreviations 4-9
Screening Room 4-9
Aeration System 4-10
Troubleshooting 4-11
5. Storage Management System 5-1
Overview 5-1
Design Data and Equipment Description 5-1
Operational Procedures 5-5

Normal Operation 5-5
Emergency Operations 5-6
Storage Pond No. 1 Liquid Level Heights 5-7
Storage Pond No. 2 Liquid Level Heights 5-8
Instrumentation and Controls 5-8
Abbreviations 5-8
Effluent Pump Station 5-9
Disinfection System 5-9
Troubleshooting 5-10
6. Land Application System 6-1
Overview 6-1
Design Data and Equipment Description 6-1
Operational Procedures 6-4
Instrument and Controls 6-9
Abbreviations 6-9
Irrigation Pump Station 6-9
Troubleshooting 6-10
Runoff Management 6-11
Silviculture Management 6-12
7. Non-Process System 7-1
Overview 7-1
Diagrams ..... D
Appendix A: DEQ Re-Use Report ..... A
Appendix B: Permit ..... B

List of Tables

Table 2.1. Heyburn State Park Collection System Design Data 2-1
Table 2.2. Heyburn State Park Lift Station Design Data 2-2
Table 2.3. Heyburn State Park Collection Pipe Design Data 2-2
Table 2.4. Heyburn State Park WWTF Design Data 2-3
Table 2.5. Heyburn State Park Storage Management System Design Data 2-4
Table 2.6. Heyburn State Park Land Application System Design Data 2-4
Table 2.7. Proposed Monitoring Schedule 2-5
Table 3.1. Rocky Point Lift station PS-1 3-2
Table 3.2. Rocky Point Lift station PS-2 3-3
Table 3.3. Rocky Point Lift station PS-3 3-4
Table 3.4. Visitors Center Lift station PS-4 3-5
Table 3.5. Hawley's Landing Lift station PS-5 3-6
Table 3.6. Chatcolet Lift station PS-6 3-7
Table 3.7. Hawley's Landing Lift station PS-7 3-8
Table 3.8. Plummer Point Lift station PS-8 3-9
Table 3.9. Plummer Point Lift station PS-9 3-10
Table 3.10. Hansen's Haven 3-11
Table 3.11. PS-10 Effluent Pump Building 3-12
Table 3.12. PS-11 Headworks Building 3-13
Table 3.11. Lift Station PS-2 and PS-6 Stand-By Generator 3-14
Table 3.12. Lift Station PS-4 and PS-5 Stand-By Generator 3-15
Table 3.13. Stand-By Generator Transfer Switch 3-16
Table 3.14. Stand-By Generator Propane Storage Tanks 3-17
Table 3.15. Collection System Wastewater Lift Stations 3-19
Table 3.16. Gravity Collection Lines 3-20
Table 3.17. Pressure Transmission Lines 3-20
Table 3.18. Stand-By Generator 3-20
Table 4.1. Influent Flow Meters 4-2
Table 4.2. Screens with Integrated Wash Press 4-3
Table 4.3. Odor Control System 4-4
Table 4.4. Treatment Ponds 4-5
Table 4.5. Fine Bubble Aeration System 4-6

Table 4.6. Positive Displacement Rotary Lobe Blowers 4-6
Table 4.7. Settling Ponds 4-7
Table 4.8. Outdoor Generator 4-8
Table 4.9. Screens with Integrated Wash Press 4-11
Table 4.10. Odor Control System 4-11
Table 4.11. Dry Media for Odor System 4-11
Table 4.12. Fine Bubble Aeration System 4-11
Table 4.13. Rotary Lobe Blowers 4-12
Table 4.13i. Alarm Autodialer 4-12
Table 4.14. Treatment Ponds 4-12
Table 4.15. Settling Ponds 4-12
Table 4.16. Positive Displacement Flexible Tube Pumps 4-12
Table 4.17. Outdoor Generator 4-13
Table 4.18. Autodialer 4-13
Table 4.19. Pipe Hangers and Supports 4-14
Table 4.20. Manual Valve and Gate operators 4-14
Table 4.21. Transfer Switches 4-14
Table 4.22. Lighting and Power Distribution Switches 4-14
Table 5.1. Positive Displacement Flexible Tube Pumps 5-1
Table 5.2. Hydraulic Membrane Pump 5-2
Table 5.3. Hydraulic Membrane Pump 5-3
Table 5.4. Storage Pond 5-4
Table 5.5. Storage Pond 5-5
Table 5.6. Storage Pond 1 Liquid Level Heights 5-7
Table 5.7. Storage Pond 2 Liquid Level Heights 5-8
Table 5.8. Hydraulic Membrane Pumps 5-10
Table 5.9. Storage Ponds 5-10
Table 6.1. Influent Flow Meters 6-1
Table 6.2. In-Line Vertical Multi-Stage Pumps 6-3
Table 6.3. Irrigation Valves and Pipes 6-3
Table 6.4. Irrigation Pump Station 6-11
Table 6.5. Flowmeter 6-11
Table 6.6. Irrigation Piping, Fittings, Sprinklers and Supports 6-11
Table 6.7. Electrical Equipment 6-11

Section 1
Introduction

Purpose

This is an update to the Operations and Maintenance (O&M) Manual prepared by Brown and Caldwell (October 2012) and has been prepared to provide the user with updated technical guidance in the proper operation of the Heyburn State Park wastewater treatment facility (WWTF) for Idaho Department of Parks and Recreation. It is intended to meet the requirements of the Idaho Department of Environmental Quality (DEQ), Wastewater Rules (IDAPA 58.01.16).

Wastewater treatment and land application is permitted under reuse permit M-221-02 issued by DEQ. A copy of the DEQ Staff Analysis is included in Appendix A and a copy of the permit is included as Appendix B. The collection, treatment and storage operations will function throughout the year. The land application system will only operate during the irrigation season (April thru October), or when the land application site is available to use the water. The remaining portion of the year all effluent is stored in storage ponds (during the non-irrigation season).

Use of the Manual

This document should be considered as a working tool for the benefit of the operator, and should be kept up to date. As operational experience is gained with this particular plant, this manual should be updated, capturing the gained knowledge. The manual should be bound in a three-ring binder to accommodate future revisions. The text should be marked to indicate to future operators that a change or correction has been made. Note the date and reference in the margin of the text and enter the correction or addition on the back of the sheet, or on a new sheet following the page. The development of this manual should thus be a continuous project with the objective being to catalog all operational and maintenance experience throughout the life of the plant.

The manual is organized by system including:

- Collection
- Treatment
- Storage Management
- Land Application

Each system is further divided into several functional categories including:

- Overview
- Design Data and Equipment Description
- Operational Procedures
- Instrumentation and Controls
- Troubleshooting

Responsible Charge Operators

For any problem with the operation of the wastewater system, please notify the shift supervisor immediately:

Current RCO:

Chris Hoosick
Heyburn State Park
57 Chatcolet Rd.
Plummer, ID 83851
Visitor Center Office: 208-686-1308

The following individuals should be called if the shift supervisor cannot correct the problem:

Backup RCO:

Jason Wererley
E3 Consulting, LLC
208-659-5471

Operator In Training: Sean Frazier
Heyburn State Park
208-686-1308

Heyburn State Park:

Park Manager

57 Chatcolet Road
Plummer, ID 83851
Visitor Center Office: 208.686.1308

Idaho Department of Parks and Recreation:

Coeur d'Alene Office
2885 Kathleen Avenue, Suite 1
Coeur d'Alene, ID 83815
Coeur d'Alene Office: 208. 769.1511

Operator Daily Responsibilities

The operators are responsible for overall system operation and for monitoring the process.

The following section summarizes general operations and control systems at the Heyburn State Park WWTF. The daily recommended operator routine consists of the following tasks.

1. Record the influent flow from two flow meters.
2. Record weather data during land application season
3. Inspect generator control panel for warning alarms.
4. Verify that screen control panel is on and clear off faults.
5. Ensure that autodialer is set in normal operation mode.
6. Inspect blowers for proper operation and record psi, temp and operating hours..
7. Visually inspect manhole (MH-1) adjacent to treatment pond 1 inlet pipe for solids buildup.

8. Visually inspect both treatment ponds for anything abnormal.
9. Visually inspect both settling ponds. Skim duckweed from ponds if necessary.
10. Enter effluent building to visually inspect pump #1 & #2 effluent pumps, Varialble Frequency Drives (VFD's), Transducer panel, Marlow-Watson flow meters, and sodium hypochlorite levels.
11. During land application irrigation season record the zone #, start and stop run times, gpm, ending meter reading and total gallons applied.
12. Visually inspect land application site for runoff and clogged sprinkler heads
13. Check and record stage of both storage ponds.
14. Perform total and free chlorine residual test from storage pond #2 sample tap.
15. Check for any needed overall plant maintenance.

The minimum weekly recommended operator routine consists of the following tasks.

1. Sweep and mop floors in headworks building.
2. Perform routine inspections of all lift stations.
3. Drain and fill effluent pump # 2 pulsation dampener every 4 days during storage pond transfer operations.
4. Hose down solids collected in Manhole (MH1) adjacent to treatment pond #1.inlet pipe.
5. Inspect belt tension on blower motor

The minimum monthly recommended operator routine consists of the following tasks.

1. Test eye wash stations to ensure they are operational.
2. Change blower air filter at 500 hr run time intervals.
3. Inspect air release valves along pressurized main lines.

For more specific information about each process, please refer to the appropriate section of the manual.

Operator Safety Procedures

Safety is an important issue at the WWTF. Monthly safety meetings should be held to discuss issues that affect all WWTF areas. All operators are encouraged to discuss any safety issue at the start of each day.

All operators are advised to be aware of moving equipment, steep ledges and adverse weather conditions. The operators are responsible for developing, maintaining and implementing their own health and safety program, polices and equipment as necessary to protect their workers and others from their activities. The operator shall refer to their Health and Safely Plan and shall include: key personnel and responsibilities, hazard analysis, personal protective equipment, site control measures, training requirements, and contingency procedures.

Section 2

System Design Information

Central Sewage Collection and Treatment System

Sewage from each source will be collected through a collection system and pumped to the WWTF. The raw sewage will enter the WWTF via two force main discharge pipes at the Headworks Building. The sewage will be screened and flows will gravity to one of two (or both) aerated lagoon biological treatment system. The treatment ponds can operate in series or independently through manual process changes. Following treatment in the lagoons, the wastewater will flow to settling ponds where solids will accumulate and supernatant will be collected, and flows to a manhole. A pipe connects the manhole to the Effluent Pump Station where flow is pumped to one of two manually selected storage ponds, Storage Pond 1 or Storage Pond 2, with one of two manually selected operating pumps. Hypochlorite is pumped into the operating effluent pump station suction pipes. The effluent that is stored in Storage Pond 1 is transferred to Storage Pond 2 at specific times of the year. During the irrigation months, treated effluent will be taken from Storage Pond 2 and applied to land via a pressurized sprinkle irrigation system.

In December 2016 Heyburn added wastewater flow and additional collection system components by accepting sewage from the Hidden Lake Float Home Association (HLFHA) wastewater collection system. Welch-Comer prepared an O&M Manual Addendum to be included as part of this O&M. See Appendix C for HLFHA O&M Addendum hereby incorporated by reference. Heyburn is responsible for mainatenance of the force main which each connection discharges to via there own septic and pumping station. Each connection owner is responsible for there own pump station, see Appendix C for further detail.

Collection System

Table 2.1. Heyburn State Park Collection System Design Data

Lift Station	Expected Average Inflow (gallons per day)	Lift Station Diameter (inches)	Incremental Drawdown (gallons per Inch)	Approximate Total Pipeline Volume (gal)
PS-1	4,500	48	7.838	15
PS-2	21,670	72	17.636	5400
PS-3	3,000	48	7.838	30
PS-4	14,563	72	17.636	2200
PS-5	3,000	48	7.838	125
PS-6	19,871	72	17.636	4650
PS-7	1,398	24	1.959	5
PS-8	800	24	1.959	25
PS-9	1000	24	1.959	50
Hansen's Haven	250	24	1.959	15
(HLFHA)	5,500	N/A	N/A	See Appendix C

Table 2.2. Heyburn State Park Lift Station Design Data			
Lift Station	Pump Model	Expected Peak Inflow (gallons per minute)	Expected Operating Point
Lift station PS-1 – Expected Operating Point	Duplex E-ONE 1hp Pump 48" Diameter W-Series Tank	12.5	12.5gpm @ 62' TDH
Lift station PS-2 – Expected Operating Point	Duplex Hydromatic HPGHHX 7.5hp pump	60	60gpm @ 150' TDH
Lift station PS-3 – Expected Operating Point	Duplex Webtrol 1.5 hp pump 48" Diameter W-Series Tank	8.33	12 gpm @ 82' TDH
Lift station PS-4 – Expected Operating Point	Duplex Hydromatic HPGHHX 7.5hp pump	40.45	42gpm @ 83' TDH
Lift station PS-5 – Expected Operating Point	Duplex E Liberty 1hp pump 48" Diameter W-Series Tank	8.33	12.5 gpm @ 55' TDH
Lift station PS-6 – Expected Operating Point	Duplex Hydromatic HPGHHX 7.5hp pump	55.20	57 gpm @ 152' TDH
Lift station PS-7 – Expected Operating Point	Simplex E-ONE 1hp pump WH-101	3.88	14 gpm @ 9' TDH
Lift station PS-8 – Expected Operating Point	Liberty 1hp pump WH-101	2.22	12.5 gpm @ 58' TDH
Lift station PS-9 – Expected Operating Point	Simplex E-ONE 1hp pump WH-101	2.78	11 gpm @ 80' TDH
Hansens Haven	Simplex E-ONE 1hp pump WH-101	0.69	11 gpm @ 98' TDH

Table 2.3. Heyburn State Park Collection Pipe Design Data						
	Pipe Slope	Velocity	Distance Between Manholes	Pipe Type	Pipe Diameters (inch)	Manhole Size
Gravity Sewer	Min. 0.004% Max. 20%	N/A	Max. 350 ft	ASTM D3034 PVC	8	4' Diameter with 4'-2' Eccentric Reducing Cone
Pressure Sewer	N/A	Min. 2 ft/sec	N/A	High Density Polyethylene, 200 PSI	1.5 and 4	N/A

Treatment System

Table 2.4. Heyburn State Park WWTF Design Data

Process or Design Criteria		Unit	Value
Design Flow			
	Future Design Average Flow	mgd	0.068
Design Loading			
	5-Day Biochemical Oxygen Demand (BOD5)	MG/L	400
	Total Suspended Solids	MG/L	400
Huber ROTAMAT Micro Strainer Ro 9 Fine Screen		Number of units	1
	Capacity	gpm	50
	Openings	Inches	0.25
	Washer/Compactor	Included	
Treatment Ponds		Number of Ponds	2
	Cells Per Pond	Number	2
	Volume of Pond	Million Gallons	0.57
	Depth Range	Feet	10
Aeration Blowers		Number of Units	1+1 standby
	Type	Positive Displacement	
Aeration Diffusers		Fine Bubbles	
Settling Ponds		Number of Ponds	2
	Volume of Unit	Million Gallons	0.069
	Depth Range	Feet	8
WWTF Generator			60 kW

Storage Management System

Table 2.5. Heyburn State Park Storage Management System Design Data

Process or Design Criteria		Unit	Value
Disinfection System			
	Chemical	Number of Pumps	2
	Chemical Concentration	Sodium Hyperchlorite	-
	Volume	%	12%
	Pump Type	Gallons	-
	Capacity	Peristaltic Gall/ hour @ PSI	1 gph@ 20 psi
Effluent Pump 1		Number of units	1
	Type	Hydraulic membrane pump	-
	Capacity	gpm @ PSI	50 gpm@ 50PSI
	Motor size	HP	7.5
Effluent Pump 2		Number of Units	1
	Type	Hydraulic membrane pump	-
	Capacity	gpm @ PSI	50 gpm@ 300PSI
	Motor Size	HP	20
Storage Pond 1		Number of Ponds	1
	Volume	Million Gallons	1.86
	Depth Range	Feet	15
Storage Pond 2		Number of Ponds	1
	Volume	Million Gallons	2.5
	Depth Range	Feet	15

Land Application System

Table 2.6. Heyburn State Park Land Application System Design Data

Process or Design Criteria		Unit	Value
Irrigation System Pump Station		Number of Pumps	3 each
	Type	Pump Type	Multi stage vertical
	Capacity	Capacity	125 gpm@ 100 PSI

Data Collection and Record Keeping Quality Assurance

Wastewater samples are collected daily, weekly and monthly as required by the permit (See Appendix B) during the operating season at the treatment facility. Typically, a weekly sample is collected to ensure representative data. Wastewater samples are sent to a water quality testing laboratory that uses Environmental Protection Agency Clean Water Act Test Methods for wastewater. Test parameters are summarized below:

Table 2.7. Proposed Monitoring Schedule			
Frequency	Monitoring Point	Type of Monitoring	Test Parameters
Daily (during irrigation season)	Flow meter in Irrigation Pump Station Building	Volume of applied wastewater	Volume (gallons/day and MG/month) to each hydraulic management unit (HMU), record, compile monthly, Volume (inches/month) to each HMU
Daily (during irrigation season)	Weather station	Record readings	High and low temperatures, precipitation
Daily (when pumping into Storage Pond #2)	Sampling Hydrant Station at Storage Pond #2	Grab samples	Total chlorine (CFU/100 mL)
Weekly (during irrigation season)	Sampling Hydrant Station at Storage Pond #2	Grab samples	Total coliform (CFU/100 mL)
Monthly (during non-irrigations season)	Storage Pond #1 Inlet Structure Sampling Hydrant Station at Storage Pond #2	Grab samples	Total coliform (CFU/100 mL)
Monthly (during Irrigations season)	Prior to first irrigation sprinkler	Grab samples	Total Kjeldahl Nitrogen (TKN) Nitrate+Nitrite-Nitrogen Total Phosphorus (mg/L)
Monthly	Storage Pond #1	Storage Ponds staff gauge level	Feet
	Storage Pond #2	Storage Ponds Volume	Gallons
Annual (in annual report)	Land Application (irrigation site) Zones #1, #2, #3, #4, #5	Total Nitrogen and Total Phosphorus loadings from non-wastewater sources (i.e. fertilizers)	Applied Total Nitrogen (lb/acre-year)
			Applied Total Phosphorus (lb/acre-year)
		Calculate GS wastewater hydraulic loading rate	Million Gallons/HMU Inches/Acre for each HMU
		Calculate Wastewater Total	Applied Total Nitrogen (lb/acre-year)
		Nitrogen and Total Phosphorus loading rates	Applied Total Phosphorus (lb/acre-year)
Annually (In the Spring prior to starting irrigation)	Land Application (irrigation site) 1 Location	Composite Soil Samples [1]	Nitrate-N
			Ammonium-N
			pH
			% organic matter
			Plant available Phosphorus (use Olson method for soils with pH 6.5 or greater, use Bray Method if soil pH is less than 6.5)
Annually	2 Flow meters in Headworks Building	Flow measurement calibration	Document the flow measurement calibration of all flow meters and pumps used directly or

Table 2.7. Proposed Monitoring Schedule			
Frequency	Monitoring Point	Type of Monitoring	Test Parameters
	1 Flow meter in Irrigation Pump Station Building		indirectly to measure all wastewater and supplemental irrigation water flows applied to the HMU.

[1] One soil sample location shall be selected for the SMU as specified in Appendix 1 of the Wastewater Reuse Permit. Three soil samples shall be collected at each sample location, one at 0-12 inches, one at 12-24 inches, and one at 24-36 inches, or refusal. The soil samples collected at each depth shall be composite to yield three samples for analysis from each SMU.

The operator shall keep a sampling log book documenting sample collection including, but not limited to, the date and time, location, sample identification and purpose of sample. Samples shall be collected using storage devices provided by the analytical testing laboratory or approved for use by the analytical testing laboratory. During collection, the sampling location shall be thoroughly flushed to assure the sample is representative of the effluent. After collection, samples should be stored as required by the sampling method and transferred to the laboratory along with chain-of-custody documents.

Laboratory results shall be collected along with copies of the sample log book on site and electronically by the operator. Laboratory results are submitted to DEQ as part of the Annual Monitoring Report. Copies of all monitoring activities and reports are maintained as required by DEQ. It is recommended that one split sample be taken during the year and sent to a third party laboratory and reported as such in the Annual Monitoring Report.

At the end of each irrigation season, during preparation of the Annual Monitoring Report, the operator will prepare a summary of the testing results as required in the permit and describe any proposed deviations to the sampling field activities to assure representative samples are taken.

Section 3

Collection System

Overview

Within the Heyburn State Park boundaries, wastewater is generated by the residential cabins, public restrooms, visitors center, maintenance shop, volunteer RV sites, wastewater headworks and effluent pump building.This wastewater flows by gravity through 4" diameter service lines to either an 8" gravity sewage collection line or directly into an lift station. The lift stations collect wastewater at strategic low points in the collection system, and pump the wastewater to a gravity collection main. Outside the park boundaries wastewater is collected from HLFHA via individual lift stations and then discharged to a pressure force main which is connected to the Heyburn collection system within park boundaries.

The gravity sewer mains direct the wastewater to one of three main lift stations located within the park. From the main lift stations the wastewater is pumped through 4" diameter, HDPE pipes to the WWTF. The pipeline from lift station #2 runs along the south side of Highway 5 until it reaches Chatcolet Road. The pressure main crosses under several creeks including Pee Dee Creek creating low spots where solids can settle if the pumps are not frequently operated. The pressure main then runs along Chatcolet Road where it interconnects, near the Visitors Center, with the 3" pressure main coming from lift station #4. After the interconnection the pressure main runs along the south side of Chatcolet Road until it reaches Plummer Creek where it turns west and heads to the WWTF. The pipeline from lift station #6 runs along the east side of Chatcolet Road and crosses under Plummer Creek then turns west to the WWTF. The crossing at Plummer Creek creates a low spot in the pipeline where solids can settle if the pumps are not frequently operated. The main lift stations are located in Rocky Point (PS-2), at the Visitors Center (PS-4), and at the Chatcolet Marina (PS-6).

At Rocky Point there are two duplex lift stations (PS-1 and PS-3), and at Hawley's Landing there is one duplex lift station (PS-5) that pump wastewater generated by the residential cabins from low points to the gravity collection mains. Simplex E-ONE lift stations are located at Hansen's Haven and Plummer Point restrooms (PS-9). and at the east restrooms at the Chatcolet campground (PS-7). The lift station that services the Wardens house, maintenance shop and volunteer RV sites (PS8) has a Liberty pump. Stand-by propane powered generators have been provided at lift stations PS-2, PS-4, and PS-6. The generator at lift station PS-2 also powers lift stations PS-1 and PS-3, and the generator at lift station PS-4 also powers lift station PS-5.

Design Data and Equipment Description

Table 3.1. Rocky Point Lift station PS-1		
Name of Equipment:	PS-1	
Location of Equipment	North End of Rocky Point	
Number of Pumps	2	
Function/Description	Lift station contains two E-ONE grinder pumps that pump residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	4' - 0"
	Pump Off Liquid Depth	1' – 0"
	Pump On Liquid Depth	1' – 6"
	High Liquid Alarm Liquid Depth	2' – 0"
	Lift Station Model	W-Series
	Average Inflow	4,500 GPD
	Peak Inflow	12.5 gpm
	Operating Point	12.5 gpm @ 62' TDH
	Horsepower	1hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well, raw sewage could overflow into the environment.	
Response Time/Action	When the liquid in the wet well is at the "pump off" elevation, the wet well will refill in approximately 50 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Environment One 2773 Balltown Road Niskayuna, NY 12309-1090 Telephone: 518-346-6161 Email: eone@eone.com Internet: www.eone.com	Distributor Correct Equipment, Inc. 14576 NE 95th Street Telephone: 425-869-1233 Fax: 425-869-1033 Internet: www.correctequipment.com Redmond, WA 98052

Table 3.2. Rocky Point Lift station PS-2			
Name of Equipment:	PS-2 (Main Lift Station)		
Location of Equipment	Southwest End of Rocky Point Near the CCC Restroom		
Number of Pumps	2		
Function/Description	Lift station contains two Hydromatic grinder pumps that pump residential wastewater to the WWTF headworks.		
Flow Stream	Raw Residential Wastewater		
Operating Characteristics	Wet Well Diameter	6' – 0"	
	Pump Off Liquid Depth	1' – 8 ¾"	
	Pump On Liquid Depth	2' – 8 ¾"	
	High Liquid Alarm Liquid Depth	3' – 11 ½"	
	Pump Model	Hydromatic HPGHHX 7.5 hp Explosion Proof Grinder Pump, 6.87" Diameter Impeller with Pultruded Rail System	
	Average Inflow	21,670 GPD	
	Peak Inflow	60 gpm	
	Operating Point	60 gpm @ 150' TDH	
	Horsepower	7.5hp	
	Phase	Three Phase	
	Voltage/Frequency	230 Volts/60Hz	
	Max Amperage:	21.5 Amps	
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.		
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 38 minutes during peak flow conditions.		
Pump Manufacturer Info	Pump Manufacturer Hydromatic 740 East 9th Street Ashland, OH 44805 Telephone: 419-289-3042 Fax: 419-281-4087 Internet: www.hydromatic.com	Pump Distributor R.C. Worst and Co. 625 Best Avenue Coeur d'Alene, ID 83814-3740 Telephone: 208-6642133 Fax: 208-667-8775 www.rcworst.com	Wet Well Manufacturer Wilbert Precast 2215 E. Brooklyn Ave. Spokane, WA 99217 Telephone: 509-325-4573 Fax: 509-325-5098 www.wilbertprecast.com

Table 3.3. Rocky Point Lift station PS-3		
Name of Equipment:	**PS-3**	
Location of Equipment	Southeast End of Rocky Point	
Number of Pumps	2	
Function/Description	Lift station contains two Webtrol grinder pumps that pump residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	4' –0"
	Pump Off Liquid Depth	2 - 0"
	Pump On Liquid Depth	2' – 6"
	High Liquid Alarm Liquid Depth	3' – 0"
	Lift Station Model	
	Average Inflow	3,000 GPD
	Peak Inflow	8.33 gpm
	Operating Point	12 gpm @ 82' TDH
	Horsepower	1.5hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 74 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer EWebtrol Pump Weber Industries, INC www.webtrol.com	Distributor B & B Sanitation 1986 W. Hayden Ave. Hayden, Idaho 83835 Ph. 208-772-3566

Table 3.4. Visitors Center Lift station PS-4			
Name of Equipment:	PS-4 (Main Pump Station)		
Location of Equipment	Near the Visitors Center		
Number of Pumps	2		
Function/Description	Lift station contains two Hydromatic grinder pumps that pump residential wastewater to the WWTF headworks.		
Flow Stream	Raw Residential Wastewater		
Operating Characteristics	Wet Well Diameter	6' – 0"	
	Pump Off Liquid Depth	1' – 8 ¾"	
	Pump On Liquid Depth	2' – 8 ¾"	
	High Liquid Alarm Liquid Depth	5' – 3 ¾"	
	Pump Model	Hydromatic HPGHHX 5.0 hp Explosion	
		Proof Grinder Pump, 5.75" Diameter	
		Impeller with Pultruded Rail System	
	Average Inflow	14,563 GPD	
	Peak Inflow	40.45 gpm	
	Operating Point	42 gpm @ 83' TDH	
	Horsepower	7.5 hp	
	Phase	Three Phase	
	Voltage/Frequency	240 Volts/60Hz	
	Max Amperage	15.6 Amps	
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.		
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 45 minutes during peak flow conditions.		
Pump Manufacturer Info	Pump Manufacturer Hydromatic 740 East 9th Street Ashland, OH 44805 Telephone: 419-289-3042 Fax: 419-281-4087 www.hydromatic.com	Pump Distributor R.C. Worst and Co 625 Best Avenue Coeur d'Alene, ID 83814-3740 Telephone: 208-6642133 Fax: 208-667-8775 www.rcworst.com	Wet Well Manufacturer Wilbert Precast 2215 E. Brooklyn Ave. Spokane, WA 99217 Telephone: 509-325-4573 Fax: 509-325-5098 www.wilbertprecast.com

Table 3.5. Hawley's Landing Lift station PS-5		
Name of Equipment:	**PS-5**	
Location of Equipment	Below the cabins at Hawley's Landing	
Number of Pumps	2	
Function/Description	Lift station contains two Liberty grinder pumps that pump residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	4' -0"
	Pump Off Liquid Depth	2' – 0"
	Pump On Liquid Depth	4' –0"
	High Liquid Alarm Liquid Depth	64' – 0"
	Lift Station Model	LSG202M
	Average Inflow	3,000 GPD
	Peak Inflow	8.33 gpm
	Operating Point	45 gpm @ 55' TDH
	Horsepower	1.5hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 74 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Liberty Pumps LSG200-Series 7000 Apple Tree Avenue Bergen, New York 14416	Distributor .

Table 3.6. Chatcolet Lift station PS-6			
Name of Equipment:	**PS-6 (Main Pump Station)**		
Location of Equipment	Near the Chatcolet Marina		
Number of Pumps	2		
Function/Description	Lift station contains two Hydromatic grinder pumps that pump residential wastewater to the WWTF headworks.		
Flow Stream	Raw Residential Wastewater		
Operating Characteristics	Wet Well Diameter	6' – 0"	
	Pump Off Liquid Depth	1' – 11"	
	Pump On Liquid Depth	2' –11"	
	High Liquid Alarm Liquid Depth	3' – 11"	
	Pump Model	Hydromatic HPGHHX 7.5 hp Explosion	
		Proof Grinder Pump, 6.87" Diameter	
		Impeller with Pultruded Rail System	
	Average Inflow	19,871 GPD	
	Peak Inflow	55.20 gpm	
	Operating Point	57 gpm @ 152' TDH	
	Horsepower	7.5hp	
	Phase	Three Phase	
	Voltage/Frequency	240 Volts/60Hz	
	Max Amperage	21.5 Amps	
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.		
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 59 minutes during peak flow conditions.		
Pump Manufacturer Info	Pump Manufacturer Hydromatic 740 East 9th Street Ashland, OH 44805 Telephone: 419-289-3042 Fax: 419-281-4087 Internet: www.hydromatic.com	Pump Distributor R.C. Worst and Co 625 Best Avenue Coeur d'Alene, ID 83814-3740 Telephone: 208-6642133 Fax: 208-667-8775 www.rcworst.com	Wet Well Manufacturer Wilbert Precast 2215 E. Brooklyn Ave. Spokane, WA 99217 Telephone: 509-325-4573 Fax: 509-325-5098 www.wilbertprecast.com

Table 3.7. Hawley's Landing Lift station PS-7		
Name of Equipment:	PS-7	
Location of Equipment	East Campground Restrooms at Chatcolet Campground	
Number of Pumps	1	
Function/Description	Lift station contains one E-ONE grinder pump that pumps residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	2' -0"
	Pump Off Liquid Depth	1' – 1"
	Pump On Liquid Depth	1' – 5"
	High Liquid Alarm Liquid Depth	2' – 1"
	Lift Station Model	WH-101
	Average Inflow	1,397.5 GPD
	Peak Inflow	3.88 gpm
	Operating Point	14 gpm @ 9' TDH
	Horsepower	1hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response time/action	When the liquid in the wet well is at the "pump off" elevation the wet well will refill in approximately 34 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Environment One 2773 Balltown Road Niskayuna, NY 12309-1090 Telephone: 518-346-6161 Internet: www.eone.com Email: eone@eone.com	Distributor Correct Equipment, Inc. 14576 NE 95th Street Redmond, WA 98052 Telephone: 425-869-1233 Fax: 425-869-1033 Internet: www.correctequipment.com

Table 3.8. Plummer Point Lift station PS-8		
Name of Equipment:	PS-8	
Location of Equipment	Near the Volunteer RV Sites	
Number of Pumps	1	
Function/Description	Lift station contains one Liberty grinder pump that pumps residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	2' -0"
	Pump Off Liquid Depth	1' – 1"
	Pump On Liquid Depth	1' – 5"
	High Liquid Alarm Liquid Depth	None
	Lift Station Model	
	Average Inflow	800 GPD
	Peak Inflow	2.22 gpm
	Operating Point	12.5 gpm @ 58' TDH
	Horsepower	1hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 63 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Liberty Pumps 7000 Apple Tree Avenue Bergen, New York 14416	Distributor R.C. Worst Coeur D Alene, ID

Table 3.9. Plummer Point Lift station PS-9		
Name of Equipment:	PS-9	
Location of Equipment	Near the Plummer Point Restrooms	
Number of Pumps	1	
Function/Description	Lift station contains one E-ONE grinder pump that pumps residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	2' -0"
	Pump Off Liquid Depth	1' – 1"
	Pump On Liquid Depth	1' – 5"
	High Liquid Alarm Liquid Depth:	2' – 1"
	Lift Station Model	WH-101
	Average Inflow	1000 GPD
	Peak Inflow	2.78 gpm
	Operating Point	11 gpm @ 80' TDH
	Horsepower	1hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 47 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Environment One 2773 Balltown Road Niskayuna, NY 12309-1090 Telephone: 518-346-6161 Internet:: www.eone.com Email: eone@eone.com	Distributor Correct Equipment, Inc. 14576 NE 95th Street Redmond, WA 98052 Telephone: 425-869-1233 Fax: 425-869-1033 Internet: www.correctequipment.com

Table 3.10. Hansen's Haven		
Name of Equipment:	**Hansen's Haven**	
Location of Equipment	Hansen's Haven Rental Cabin	
Number of Pumps	1	
Function/Description	Lift station contains one E-ONE grinder pump that pumps residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	2' -0"
	Pump Off Liquid Depth	1' – 1"
	Pump On Liquid Depth	1' – 5"
	High Liquid Alarm Liquid Depth	2' – 1"
	Lift Station Model	WH-101
	Average Inflow	250 GPD
	Peak Inflow	0.69 gpm
	Operating Point	11 gpm @ 98' TDH
	Horsepower	1hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 189 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Environment One 2773 Balltown Road Niskayuna, NY 12309-1090 Telephone: 518-346-6161 Internet:www.eone.com Email:eone@eone.com	Distributor Correct Equipment, Inc 14576 NE 95th Street Redmond, WA 98052 Telephone: 425-869-1233 Fax: 425-869-1033 Internet: www.correctequipment.com

Table 3.11. PS-10 Effluent Pump Building		
Name of Equipment:	**PS-10**	
Location of Equipment	Effluent Pump Building	
Number of Pumps	1	
Function/Description	Lift station contains one E-ONE grinder pump that pumps residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	2' -0"
	Pump Off Liquid Depth	1' – 1"
	Pump On Liquid Depth	1' – 5"
	High Liquid Alarm Liquid Depth	2' – 1"
	Lift Station Model	WH-101
	Average Inflow	250 GPD
	Peak Inflow	0.69 gpm
	Operating Point	11 gpm @ 98' TDH
	Horsepower	1hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 189 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Environment One 2773 Balltown Road Niskayuna, NY 12309-1090 Telephone: 518-346-6161 Internet:www.eone.com Email:eone@eone.com	Distributor Correct Equipment, Inc 14576 NE 95th Street Redmond, WA 98052 Telephone: 425-869-1233 Fax: 425-869-1033 Internet: www.correctequipment.com

Table 3.12. PS-11 Headworks Building		
Name of Equipment:	**PS-11**	
Location of Equipment	Headworks Building	
Number of Pumps	1	
Function/Description	Lift station contains one E-ONE grinder pump that pumps residential wastewater to a gravity sewage collection line.	
Flow Stream	Raw Residential Wastewater	
Operating Characteristics	Wet Well Diameter	2' -0"
	Pump Off Liquid Depth	1' – 1"
	Pump On Liquid Depth	1' – 5"
	High Liquid Alarm Liquid Depth	2' – 1"
	Lift Station Model	WH-101
	Average Inflow	250 GPD
	Peak Inflow	0.69 gpm
	Operating Point	11 gpm @ 98' TDH
	Horsepower	1hp
	Phase	Single Phase
	Voltage/Frequency	240 Volts/60Hz
	Max Amperage	8 Amps
Effect of Failure	If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in the wet well is at the "pump off" elevation the wet well will refill in approximately 189 minutes during peak flow conditions.	
Manufacturer Info	Manufacturer Environment One 2773 Balltown Road Niskayuna, NY 12309-1090 Telephone: 518-346-6161 Internet:www.eone.com Email:eone@eone.com	Distributor Correct Equipment, Inc 14576 NE 95th Street Redmond, WA 98052 Telephone: 425-869-1233 Fax: 425-869-1033 Internet: www.correctequipment.com

Table 3.11. Lift Station PS-2 and PS-6 Stand-By Generator		
Name of Equipment:	**PS-2 and PS-6 Stand-By Generator**	
Location of Equipment	Lift Station PS-2 – Located near the CCC Restroom at Rocky Point Lift Station PS-6 – Located near the Chatcolet Day Use parking area.	
Number of Units	1 at each lift station	
Function	Provide electricity to run the lift station in the event of a power outage.	
Operating Characteristics	Model	Olympian - G75F3S
	Power	55 kW
	Frequency	60 Hz
	Voltage	120/240V – Single Phase – 2 Pole
	Rotational Speed	1,800 RPM
	Fuel Type	LP Liquid
	Cooling System	Liquid Cooled
	Engine	Ford Motor Company, Model WSG1068, 4 Cycle, 10 Cylinder, 6.8L
Effect of Failure	Wastewater pumps will not operate during a power outage. If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If the wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in lift station PS-2 wet well is at the "pump off" elevation the wet well will refill in approximately 38 minutes during peak flow conditions. When the liquid level in lift station PS-6 wet well is at the "pump off" elevation the wet well will refill in approximately 59 minutes during peak flow conditions.	
Manufacturer Info	Caterpillar Corporate Headquarters 100 North East Adams Street Peoria, IL 61629 Telephone: 309-675-1000 Internet: www.cat.com	Local Caterpillar Dealer General Line Parts 4625 East Trent Avenue Spokane, WA 99212 Telephone: 509-535-1744
	Generator Service Contract Provided By:	

Table 3.12. Lift Station PS-4 and PS-5 Stand-By Generator		
Name of Equipment:	**PS-4 and PS-5 Stand-By Generator**	
Location of Equipment	Located near the Visitors Center.	
Number of Units	1	
Function	Provide electricity to run the lift station in the event of a power outage.	
Operating Characteristics	Model	Olympian – G45F3S
	Power	45 kW
	Frequency	60 Hz
	Voltage	120/240V – Single Phase – 2 Pole
	Rotational Speed	1,800 RPM
	Fuel Type	LP Vapor
	Cooling System	Liquid Cooled
	Circuit Breaker	150 Amp – 2 Pole
	Engine	Ford Motor Company, Model ESG642, 4 Cycle, 6 Cylinder, 4.2L
Effect of Failure	Wastewater pumps will not operate during a power outage. If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If the wastewater continues to flow into the wet well raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in lift station PS-4 wet well is at the "pump off" elevation the wet well will refill in approximately 45 minutes during peak flow conditions. When the liquid level in lift station PS-5 wet well is at the "pump off" elevation the wet well will refill in approximately 74 minutes during peak flow conditions.	
Manufacturer Info	Caterpillar Corporate Headquarters 100 North East Adams Street Peoria, IL 61629 Telephone: 309-675-1000 Internet: www.cat.com	Local Caterpillar Dealer General Line Parts 4625 East Trent Avenue Spokane, WA 99212 Telephone: 509-535-1744
	Generator Service Contract Provided By:	

Table 3.13. Stand-By Generator Transfer Switch		
Name of Equipment:	**Stand-By Generator Transfer Switch**	
Location of Equipment	Located near the stand-by generators.	
Number of Units	3, one at each stand-by generator	
Function	Electrically connect the lift stations to the generator during an electricity outage. Isolate the generator from the utility company's power transmission lines.	
Operating Characteristics	Manufacturer	Caterpillar
	Model	CTGD Series
	Size	PS-2 and PS-6 - 150 Amps PS-4 – 225 Amps
	Enclosure	NEMA 4
Effect of Failure	The generators will not be electrically connected to the lift stations. If there is a power outage, the wastewater pumps will not operate. If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If the wastewater continues to flow into the wet well, raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in lift station PS-2 wet well is at the "pump off" elevation the wet well will refill in approximately 38 minutes during peak flow conditions. When lift station PS-6 wet well is empty it will refill in approximately 59 minutes during peak flow conditions. When the liquid level in lift station PS-4 wet well is at the "pump off" elevation the wet well will refill in approximately 45 minutes during peak flow conditions. When the liquid level in lift station PS-5 wet well is at the "pump off" elevation the wet well will refill in approximately 74 minutes during peak flow conditions.	
Manufacturer Info	Caterpillar Corporate Headquarters 100 North East Adams Street Peoria, IL 61629 Telephone: 309-675-1000 Internet::www.cat.com	Local Caterpillar Dealer General Line Parts 4625 East Trent Avenue Spokane, WA 99212 Telephone: 509-535-1744

Table 3.14. Stand-By Generator Propane Storage Tanks		
Name of Equipment:	Stand-By Generator Propane Storage Tank	
Location of Equipment	Located near the stand-by generators.	
Number of Units	3, one at each stand-by generator	
Function	Provide fuel storage for the stand-by generators.	
Operating Characteristics	Model	Trinity Containers
	Capacity	500 Water Gallons
	Outside Diameter	37.42 Inches
	Head Type	Hemispherical
	Overall Length	9 Feet – 10 Inches
	Overall Height	3 Feet – 9 11/16 Inches
	Leg Width	15 Inches
	Leg Spacing	5 Feet – 0 Inches
	Weight	871 Pounds
Effect of Failure	Fuel will not be supplied to the stand-by generators. If there is a power outage, the wastewater pumps will not operate. If the pumps fail to operate, wastewater will collect in the wet well until the high water alarm is activated. If the wastewater continues to flow into the wet well, raw sewage could overflow into the environment.	
Response Time/Action	When the liquid level in lift station PS-2 wet well is at the "pump off" elevation the wet well will refill in approximately 38 minutes during peak flow conditions. When lift station PS-6 wet well is empty it will refill in approximately 59 minutes during peak flow conditions. When the liquid level in lift station PS-4 wet well is at the "pump off" elevation the wet well will refill in approximately 45 minutes during peak flow conditions. When the liquid level in lift station PS-5 wet well is at the "pump off" elevation the wet well will refill in approximately 74 minutes during peak flow conditions.	
Manufacturer Info	Tank Manufacturer Trinity Containers Telephone: 888-558-8265 Internet: www.trinitycontainers.com	Local Distributor Banner Furnace and Fuel North 122 Helena Spokane, WA 99202 Telephone: 509-535-1711
	Propane Storage Tank Service Contract Provided By: (To be filled out by owner when contract is obtained.)	

Operational Procedures

Typically the lift stations will operate automatically with the rise and fall of the liquid level in the lift station. Wastewater enters the lift station wet wells via gravity sewer lines. The incoming wastewater raises the liquid level in the wet well until the pump is activated. As the pump removes wastewater from the wet well the liquid level falls until the pump is deactivated. If more wastewater is entering the wet well than can be removed by one pump, the water level will rise until the second pump is activated, increasing the amount of wastewater being pumped from the wet well. If there is more wastewater entering the wet well than 2 pumps can remove, or if both pumps are inoperable, the liquid level will rise until it activates the "high level alarm". The high level alarm will activate a solid white light to announce

the high liquid level in the wet well. The high level alarm will also activate an audible alarm in lift stations PS-1, PS-3, PS-5, PS-7, , PS-9, PS-10, PS-11 and Hansen's Haven. In lift stations PS-2, PS-3, PS-4, PS-5 and PS-6 the pumps and alarms are activated using float switches. In lift stations PS-1, , , PS-7, , PS-9, PS-10, PS-11 and Hansen's Haven use pressure bell transducers to control the pump and activate alarms. All lift stations have a manual alarm reset at each control panel to turn the alarm off except PS-8 which currently has no alarm

If the pressure transmission lines become plugged by foreign objects or buildup of solids, the lines should be flushed with fresh water to remove the clog. At lift stations PS-1, PS-3, PS-5, and PS-7, flush water can be injected into the pipeline where the piping penetrates the wet well wall or where the pressure line enters the gravity sewer manhole. At lift stations PS-8, PS-9, and Hansen's Haven the flush water will have to be injected where the pressure pipeline penetrates the wet well wall. At lift stations PS-2, PS-4, and PS-6 the flush water can be injected where the pressure pipeline at the WWTF, or fittings can be removed inside the valve vaults to inject flush water.

Typically the generators will not be in operation. The generator control panel will start and test the generator at predetermined intervals but generally the generators will not be in operation until there is an electricity outage. During an electricity outage the transfer switches will detect the outage and send a signal to start the generators and electrically disconnect the line power and connect the lift stations to the generators. Maintenance on the generators, transfer switches, and the storage tanks should only be performed by certified technicians approved by the manufacturers.

Instrumentation and Controls

Lift stations PS-1, , , PS-7, , PS-9, and Hansen's Haven all utilize E-ONE grinder pumps to pump wastewater out of the wet well. The E-ONE pumps use pressure bell transducers to turn the pumps on and off and to signal a high liquid level alarm. The settings to determine when the pumps turn on and off and when to activate the high liquid level alarm are set at the factory and can not be changed. Lift stations PS-1, PS-3, use the E-ONE T260 duplex control panel. This control panel provides an alternating and lead lag functions to control the pumps. The alternating function of this control panel allows one pump to perform all the pumping for a 24 hour period. After 24 hours the control panel switches power to the other pump for a 24 hour period. The lead/lag function operates one pump (lead pump) at a time. If the liquid level reaches the high liquid alarm level, the two grinder pumps will operate simultaneously for 3 to 4 minutes. If, after that time, the liquid is not below the high liquid alarm level, the audio and visual alarms are activated. Lift stations PS-7, PS-8, PS-9, PS-10, PS-11 and Hansen's Haven use the E-ONE Sentry simplex control panel. Both the duplex and simplex control panels provide audio and visual high liquid level alarms with manual silence, circuit breakers, manual run feature, and run indicators. See manufacturer's literature for additional details.

Lift stations PS-2, PS-4, and PS-6 utilize Hydromatic grinder pumps to pump wastewater out of the wet well. The Hydromatic pumps utilize duplex control panels manufactured by Controlfreek and floats to turn the pumps on and off, and to signal high and low liquid level alarms. These control panels provide lead/lag pump starting and alternating pump starting. The lead/lag function operates one pump (lead pump) until the liquid level reaches the "lag pump on" elevation, then the second pump (lag pump) is activated. The alternating function alternates starts between the two pumps to provide even usage for each pump. For each pump the control panel records pump starts and pump run time and has hand-off-auto (HOA) switches. The HOA switches allow each pump to be put in automatic mode where the liquid level in the wet well dictates when the pump operates or hand mode where the pumps operate continuously regardless of the liquid level in the wet well. The "off" position on the HOA switch turns the pumps off regardless of the liquid level. The control panels also provide audio and visual alarms for high liquid level, pump seal fail, pump thermal overload, power supply lights and run light indicators. See manufacturer's literature for additional details.

Troubleshooting

Troubleshooting procedures for each piece of equipment can be found in the specific equipment operation and maintenance manuals. Follow the equipment manufacturer recommendations for troubleshooting components for the Treatment System.

The tables below are for operators to assemble and log information as troubleshooting techniques are developed during operation of the facility.

Table 3.15. Collection System Wastewater Lift Stations

Symptom	Possible Cause	Response
Pumps Not Operating	Power Disconnected	Make sure switch is in “auto”.
		Make sure power is supplied to control panel.
		Make sure generator is operational.
		Check fuses in control panel if applicable
		Make sure pump is not over heating
		Make sure impeller is not jammed
High Liquid Level in Wet Well	Pumps Not Operating	See above.
	Shut Off Valves Closed	Open valves
	Piping Clogged	Check pipe outlet at WWTF for discharge. Unclog transmission line. See pressure transmission lines.
	Excessive Inflow	Survey service area for signs of inflow and infiltration
	Pumps Operating Below Design Point	Check pump discharge rate by performing a timed drawdown test. Pull pumps and inspect impeller for debris.
	Floats Not in Proper Operating Position	Check float placement.
Moisture Probe Alarm	Leaking Seal in Pump Motor	Replace motor seal.
Pump Thermal Overload Alarm	Plugged Pump or Piping	Check pumps for debris. Check pipe outlet at WWTF for discharge.
	Broken Pipe	Locate break and repair.
	Bearing Failure	Replace bearing.
Start Counter Excessively High for One Pump (Duplex Stations)	One Pump Not Operating	Make sure power is being supplied to pump. Check impeller for debris and make sure impeller rotates freely. Check fuses in control panel if applicable.
	Control Panel Not Alternating Pumps	Check control panel for proper pump alternating.
Run Time Excessive for One Pump (Duplex Stations)	One Pump Not Operating	See above.
	Control Panel Not Alternating Pumps.	See above.

Table 3.16. Gravity Collection Lines		
Symptom	Possible Cause	Response
Plugged Pipeline	Large Foreign Object In Pipe	Flush with water. If flushing with water does not work, contact jet rodding contractor to dislodge plug.
	Buildup of Solids in Pipeline	See above.
	Tree Root Intrusion	Hire contractor to cut tree roots out of pipe and remove near-by trees.
		If none of the above actions clears pipe, hire contractor to run pipe camera down pipeline to determine exact cause and location of plug.

Table 3.17. Pressure Transmission Lines		
Symptom	Possible Cause	Response
Plugged Pipeline	Large Foreign Object In Pipe	Flush with water, the pressure sewer lines used in the Park are rated to 200 psi. If flushing with water does not work, contact jet rodding contractor to dislodge plug.
	Buildup of Solids in Pipeline	See above.

Table 3.18. Stand-By Generator		
Symptom	Possible Cause	Response
Generator Will Not Start	Dead Battery	Contact generator maintenance provider.
	Mechanical or Electrical Problem	
	Fuel Tank Empty	Contact propane supplier.
Generator Will Start, but Transfer Switch Will Not Transfer Power	Transfer Switch Failure	Contact generator maintenance provider.
Fuel Tank Empty		Contact propane supplier.

Section 4
Treatment System

Overview

The Biological Treatment System consists of influent screening, odor control, lagoon treatment ponds, and settling ponds. Screenings removal is the first step of the wastewater treatment process for the Heyburn State Park WWTF. Screenings consist of physically removing items using a screen including, but not limited to, hair and other fibrous or filamentous material, plastics, rubber, wood, paper, leaves, rags, and tree roots. Some organic putrescible solids will be removed with the screenings. Screenings removed from wastewater will be washed to return the organic matter back to the treatment process.

The primary purpose for screens ahead of a lagoon treatment system is to remove floating unsightly, potentially odorous, material from the lagoon surface. A 6-mm clear opening screen is satisfactory in removing most all objectionable material found in domestic wastewater.

One screen will be installed with the capacity to handle the peak hour flow rate of the community at build out. The screening facility includes a passive bypass to overflow if the screen plugs. The screenings processes will produce odorous air. Odorous air will require treatment in order not to adversely impact the surrounding community and the WWTF site environment. Foul air treatment system alternatives include a biofilter or a deep bed carbon absorber with activated carbon. The screenings are washed, compacted, and discharged into a dumpster. The dumpster is located in the screenings structure. Foul air treatment is provided for the screening room in the building.

Multi-cell aerated lagoons are constructed to treat the wastewater. A 60-mil welded high density polyethylene (HDPE) liner is installed in each lagoon to prevent leakage. The lagoons are constructed with 1:3 inside side slopes and 1:2 outside side slopes. Two lagoons are constructed for the biological treatment process. Each lagoon will be baffled into two operating cells. Each lagoon is able to be bypassed to allow the treatment to be uninterrupted for maintenance purposes. Under normal operation at full capacity, the wastewater will flow through both lagoons in series.

Aeration equipment is provided for each lagoon. The air can be manually controlled in each cell with the highest percentage of air delivered to the first cell in the series. Dissolved oxygen is tested manually.

The outlet structures in both lagoons now have diffusers installed underneath them to prevent ice buildup that can form a plug during extreme cold weather events. The supply of air can be manually controlled to each diffuser. Sending air to these diffusers is not needed when the threat of ice buildup has diminished.

During the winter months, while influent flows are at a yearly low, one lagoon may be taken offline to reduce operational costs. The offline lagoon can remain full providing the valve that sends air to the diffusers located at the bottom of the lagoon remains slightly cracked during the winter months to allow a minimum air trickle to prevent backflow into the pipes.

Wastewater exits the aerated lagoons via gravity and enter one of two settling ponds placed in parallel. Solids settle out in the settling ponds and supernatant is collected as effluent to be pumped to one of two storage ponds. Following the aerated lagoons and settling ponds, a hypochlorite solution is injected into the effluent conveyance line, and the effluent is pumped to one of two treated water storage ponds, which is lined.

Solids are stored in the settling ponds and disposed of on an as-needed basis. This is expected to occur every 5 years to 10 years.

Design Data and Equipment Description

Table 4.1. Influent Flow Meters		
Name of Equipment:	**Siemans MAG 5100**	
Location of Equipment	In the Screen Room (Headworks Building)	
Number of Units	2	
Function	Flow Sensor for Influent Flow.	
Flow Stream	Raw Wastewater	
Operating Characteristics	Nominal Size	100 mm (4")
	Liner Material	EPDM
	Ambient Temperature	-40° to 70°
	Operating Pressure	0.03 to 20 bar
	Material	Carbon Steel
	Liner	NBR Hard Rubber
Effect of Failure	Influent raw wastewater flow will not be measured.	
Response Time/Action	1 day	
Manufacturer Info	Siemens Corporation 153 East 53rd Street New York, NY 10022-4611 Telephone: 1-800-743-6367 Email: email.us@siemens.com Internet:www.usa.siemens.com	

Table 4.2. Screens with Integrated Wash Press		
Name of Equipment:	ROTAMAT Micro Strainer Ro9	
Location of Equipment	In the Screen Room (Headworks Building)	
Number of Units	1	
Function	Removes grit from wastewater stream by allowing grit to settle, while keeping organic solids in suspension	
Flow Stream	Grit slurry	
Operating Characteristics	Basket Diameter	300 mm
	Wedge Wire Spacing	≥0.5 mm
	Perforation Diameter	≥3 mm
	Inclination	from 35° to 48°
	Horsepower (HP)	1.5
	Motor Speed (RPM)	1680
Effect of Failure	Only one Rotamat Screen exists. Loss would eliminate ability to remove screenings from raw sewage.	
Response Time/Action	1 day	
Manufacturer Info	Huber Technology, Inc 9805 NorthCross Center Ct, Suite H Huntersville, NC 28078 Telephone: (704) 949-1010 Internet:www.huber-technology.com	

Table 4.3. Odor Control System		
Name of Equipment:	**Pure Air Filtration**	
Location of Equipment	Headworks Building	
Number of Units	1	
Function	A carbon bed odor control system that will remove foul air from the screening room.	
Flow Stream	Foul Air	
Operating Characteristics	Odor Control Carbon Drum	
	Material	Fiberglass Reinforced Plastic (RFP)
	Diameter	5 feet
	Odor Control Fan	
	Flow	1,000 CFM
	Power	5 HP
	Dry Chemical Media	
	Media	Sulphasorb XL
	H2S Removal Capacity (by volume)	0.30 g/cc
	Appearance	Black granules
Effect of Failure	Significant reduction in treatment facility odors.	
Response Time/Action	Immediate.	
Manufacturer Info	Pure Air Filtration 6050 Peachtree Pkwy, Suite 240-187 Atlanta, Georgia 30092 Telephone: 678-935-1431 Fax: 678-935-0548	

Table 4.4. Treatment Ponds		
Name of Equipment:	**Treatment Ponds 1 and 2**	
Location of Equipment	In the Center of the Treatment Facility	
Number of Units	2	
Function	The Treatment Ponds oxygenate the water and removes soluble biochemical oxygen demand (BOD).	
Flow Stream	Screened Wastewater	
Operating Characteristics	Length	225 feet
	Width	90 feet
	Depth	10 feet
	Freeboard	3 feet
	Baffles	
	Material	Polypropylene
	Thickness	45 mil
	Liner	
	Material	60 mil textured HDPE geomembrane
Effect of Failure	Significant reduction in treatment capacity. Settling Ponds and other down steam processes will be overloaded.	
Response Time/Action	Immediate.	
Liner Manufacturer Info	Northwest Linings & Geotextile Products, Inc. 21000 77th Ave South Kent, Washington 98032 Telephone: 253-872-0244 Fax: 253-872-0245 Internet:www.northwestlinings.com	
Baffle Manufacturer Info	Layfield Environmental Systems 1166 Fesler St, Suite 8 El Cajon, CA 92020 Telephone: 619-562-1200 Fax: 619-562-1150	

Table 4.5. Fine Bubble Aeration System		
Name of Equipment:	EDI Aeration/ Mixing Equipment	
Location of Equipment	Treatment Ponds	
Number of Units	1	
Function	An aeration system to supply dissolved oxygen and create adequate mixing in the treatment ponds where the biological reactions may take place.	
Flow Stream	Screened Wastewater	
Operating Characteristics	Total System Airflow	501 scfm
	Diffuser Airflow	7.83 scfm
	Number of Diffusers	64
	Diffuser Depth	9 feet
Effect of Failure	Significant reduction in treatment capacity. Settling Ponds and other down steam processes will be overloaded.	
Response Time/Action	Immediate.	
Manufacturer Info	Environmental Dynamics, Inc 5601 Paris Road Columbia, MO 65202 Telephone: 573-474-9456	

Table 4.6. Positive Displacement Rotary Lobe Blowers	
Name of Equipment:	Kaeser Model DB166C
Location of Equipment	Headworks Building
Number of Units	3
Function	Supplies pressurized air to the diffuser systems of the Treatment Ponds,
Flow Stream	Pressurized Air
Operating Characteristics	3 blowers at 372 cfm for a total of 1,116 scfm
Effect of Failure	Loss of pressurized air to aeration system
Response Time/Action	Immediate.
Manufacturer Info	Kaeser Compressors PO BOX 946 Fredricksburg, Virginia 22404 Telephone: 540-898-5500 Fax: 540-898-5520 Internet: www.kaeser.com

Table 4.7. Settling Ponds		
Name of Equipment:	**Settling Ponds 1 and 2**	
Location of Equipment	Next to headworks near front of plant	
Number of Units	2	
Function	A settling pond for the removal of the settleable solids. The settled solids (sludge) are removed (dredged) periodically as determined by wastewater characteristics.	
Flow Stream	Screened and digested wastewater	
Operating Characteristics	Pond	
	Length	73 feet
	Width	73 feet
	Depth	8 feet
	Freeboard	3 feet
	Liner	
	Material	60 mil textured HDPE geomembrane
Effect of Failure	Treatment must be by-passed	
Response Time/Action	Immediate.	
Liner Manufacturer Info	Northwest Linings & Geotextile Products, Inc 21000 77th, Ave South Kent, Washingtron Telephone: 253-872-0244 Fax: 253-872-0245	

Table 4.8. Outdoor Generator		
Name of Equipment:	Caterpillar Standby Rated Generator	
Location of Equipment	West of Headworks Building	
Number of Units	1	
Function	Standby Propane-Engine Generator for the Treatment Facility	
Operating Characteristics	Model	G60F3
	Fuel	LPG Liquid
	Phase	3
	Hertz	60
	Volts	480/277
	RPM	1800
Effect of Failure	Significant reduction in treatment capacity in case of an emergency.	
Response Time/Action	Immediate.	
Manufacturer Info	Western States Equipment 4625 E. Trent Ave Spokane, WA 99212 Telephone: 509-535-1744 Fax: 509-533-9176	

Operational Procedures

Following influent screening, the flows gravity to the Treatment Ponds. The Treatment Ponds operate under one of two conditions (1) Normal Operation, where wastewater will flow through both ponds, and (2a) Reduced Operation No. 1, where Treatment Pond 2 is off-line and Treatment Pond 1 is utilized, and (2b) Reduced Operation No. 2, where Treatment Pond 1 is off-line and Treatment Pond 2 is utilized.. This will allow the treatment process to be uninterrupted for maintenance and or emergency purposes. The below describes the effluent flow path and valve operations for each condition.

Normal Operation

Overview

Normal Operation will function with both Treatment Ponds on-line. Flows will enter the treatment ponds area from the Headworks Building and flow through the 12-inch sanitary sewer pipes to Manhole Number 1 and onto Treatment Pond 1. The flows will exit Treatment Pond 1 via the Pond Outlet Structure and flow through the 12-inch sanitary sewer pipe to Manholes 6, 4, 5 and 13 then onto the Treatment Pond 2 Inlet Structure. The flows will move through Treatment Pond 2 flow to the Outlet Structure where it will pass through Manholes7 and 8 and onto the Settling Ponds.

Procedure- Normal Operation

Please see the attached diagram 4a for the Normal Operation flow and valve processes.

Reduced Operation No. 1: Treatment Pond 2 Off-Line

Overview

Reduced Operation No. 1 will function with Treatment Pond No. 2 off-line. Flows will enter the Treatment Pond area from the Screening Process and flow through Manhole 1 to the inlet structure of Treatment

Pond 1. The effluent will flow through the pond and exit through the pond outlet structure, through Manholes 6, 7 and 8 and onto the Settling Ponds.

Procedure- Reduced Operation No. 1

Please see the attached diagram 4b for the Reduced Operation No. 1 flow and valve processes.

Reduced Operation No. 2: Treatment Pond 1 Off-Line

Overview

Reduced Operation No. 2 will function with Treatment Pond No. 1 off-line. Flows will enter the Treatment Pond area from the Screening Process and flow through Manholes 1, 2, 3, 4, 5 and 13 of the 12-inch sanitary sewer pipe to the inlet structure of Treatment Pond 2. The effluent will flow through the pond and exit via the pond outlet structure. The effluent will travel through Manholes 7 and 8 and onto the Settling Ponds.

Procedure- Reduced Operation No. 2

Please see the attached diagram 4c for the Reduced Operation No. 2 flow and valve processes.

Instrumentation and Controls

Abbreviations

The following are abbreviations used in this section:

SCADA:	Supervisory Control and Data Acquisition System
PLC:	Programmable Logic Controller
HMI:	Human Machine Interface
HOA:	Hand Off Auto
HOR:	Hand Off Remote
MCC:	Motor Control Center
OCA:	Open Close Auto
OCR:	Open Close Remote
OIT:	Operator Interface Terminal
OSC:	Open Stop Close
LCP:	Local Control Panel
LOR:	Local Off Remote

Screening Room

Overview

The water level differential across each screen is measured by level sensors located upstream and downstream of the screens. The screen drive motors turns the screen to move solids retained on the screen out of the liquid and to the top of the screen. Solenoid valves control water spray, which clean solids off the screen and discharge the solids into a conveyor. The conveyor transports the screenings through a washer and discharge screenings into a dumpster.

Procedure-Manual Operation

1. A LOCKOUT/STOP switch is provided at the screen to allow local operation or lockout of the equipment.
2. A HAND/OFF/REMOTE switch is provided at the MCC for each screen drive motor starter. The screen drive runs in HAND, stop in OFF, and responds to the LCP in REMOTE.
3. A HAND/OFF/AUTO screen element is provided at the LCP and is enabled when the HOR switch is in REMOTE. The screen drive is in HAND, stop in OFF, and responds to the local PLC in AUTO.
4. OPEN/CLOSE/REMOTE switches provided for solenoid valves in the field. The valves open in OPEN, close in CLOSE, and responds to the LCP in REMOTE.
5. A LEVEL/TIMER automatic mode selector screen element is provided at the OIT. With the HOR in REMOTE and the HOA in AUTO, the screen runs under automatic level control in LEVEL and runs under automatic timer control in TIMER.

Procedure - Automatic Operation (Normal Conditions)

1. Local control station is not in STOP.
2. HOR, HOA, OCR, and OCA controls must be in REMOTE and AUTO.
3. Mode selection controls must be in LEVEL or TIMER.
4. In LEVEL mode, the screen cleaning cycle starts when the differential water level reaches an adjustable HIGH LEVEL setpoint. The screen continues to run until the differential level reaches an adjustable LOW LEVEL setpoint. The system is provided with timing, tuning, and sensor signal conditioning as required to filter transients in level signals caused by opening and closing valves, starting and stopping screen, etc.
5. In TIMER mode, the screen runs for adjustable ON TIME/OFF TIME cycles.
6. The conveyor water supply solenoids are open when the screen is called to run and remain open after the screen stops for an adjustable time (0-5 minutes).

Procedure - Automatic Operation (Emergency Conditions)

1. Flow shall passively bypass screen in emergency operation.

Aeration System

Procedure- Manual Operation

1. A LOCKOUT/STOP switch is provided for each drive motor to allow operation and LOCKOUT at the equipment location.
2. HAND/OFF/REMOTE switches are provided at each drive motor starter at the MCC. The equipment runs in HAND, stop in OFF, and responds to the LCP in REMOTE.
3. HOA control elements are provided at the OIT and is enabled when the HOR is in REMOTE. The equipment runs in HAND, stop in OFF, and responds to the local PLC in AUTO.

Procedure- Automatic Operation

1. LOS will not be in STOP.
2. HOR is in REMOTE and HOA is in AUTO.

Procedure- Interlocks

All equipment will require manual reset following a fault related shutdown. Equipment operation will be re-settable at the OIT.

1. Motor drives will be shutdown if a sequence fault, overload, or phase fail is detected.

Troubleshooting

Troubleshooting procedures for each piece of equipment can be found in specific equipment operation and maintenance manuals. Follow the equipment manufacturer recommendations for troubleshooting components for the Treatment System.

The tables below are for operators to assemble and log information as troubleshooting techniques are developed during operation of the facility.

Table 4.9. Screens with Integrated Wash Press		
Symptom	**Possible Cause**	**Response**
Conrol Panel Shut Down	Power interruption, Undervoltage	The park experiences many power interuptions. The screen control panel is sensitive to temporary undervoltage situations and shuts down. Press reset button to clear fault and power up.

Table 4.10. Odor Control System		
Symptom	**Possible Cause**	**Response**

Table 4.11. Dry Media for Odor System		
Symptom	**Possible Cause**	**Response**

Table 4.12. Fine Bubble Aeration System		
Symptom	**Possible Cause**	**Response**

Table 4.13. Rotary Lobe Blowers		
Symptom	Possible Cause	Response
Unexpected Shut Down	Power interruption, undervoltage/overvoltage	The equipment is very sensitive to power interuptions. A millisecond power interruption will shut the blower off. In most cases it can be reset at the control panel. If reset does not sresolve the problem a second circuit interrupter is found behind the cabinet door and must be reset.
		Serious injury or death can result from touching electrically live components. Swith off and lock out the supply disconnecting device before resetting.

Table 4.13i. Alarm Autodialer		
Symptom	Possible Cause	Response

Table 4.14. Treatment Ponds		
Symptom	Possible Cause	Response

Table 4.15. Settling Ponds		
Symptom	Possible Cause	Response
Surface Algea Bloom	High water temp, low DO	Can be controlled by using a high pressure nozzle and hose connected to an existing fresh water supply to spray surface area of pond daily until conditions change.

Table 4.16. Positive Displacement Flexible Tube Pumps		
Symptom	Possible Cause	Response

Shuts down, displays fault message	Power interruption, undervoltage	Disconnect power supply cord and reconnect to outlet to clear fault.

Table 4.17. Outdoor Generator

Symptom	Possible Cause	Response
Engine wont start	Dead Battery	On board battery charger may have failed
Engine wont start(winter)	Dead Battery, Engine heater failed	Verify engine heater failed and replace if neccesary

Table 4.18. Autodialer

Symptom	Possible Cause	Response

Table 4.19. Pipe Hangers and Supports		
Symptom	Possible Cause	Response

Table 4.20. Manual Valve and Gate operators		
Symptom	Possible Cause	Response

Table 4.21. Transfer Switches		
Symptom	Possible Cause	Response
No power to pump control panel	Transfer switch is locked out	Verify utility power is available Visually inspect transfer switch Follow instruction on inside door panel and manually override locked out condition. Caution high voltage!!

Table 4.22. Lighting and Power Distribution Switches		
Symptom	Possible Cause	Response

Section 5

Storage Management System

Overview

Effluent from the settling ponds is conveyed to either Storage Pond 1 or Storage Pond 2 based on normal operation or reduced operation (irrigation season or winter season). Effluent from the Settling ponds is injected with sodium hypochlorite and disinfection occurs in the transmission line to Storage Pond 1. Effluent stored in Storage Pond 1 is injected again with sodium hypochlorite and disinfection occurs in the transmission line to Storage Pond 2. Storage Pond 2 retains the effluent until seasonal irrigation begins.

The wastewater effluent is treated to Class C reclaimed water standards prior to discharge. Disinfection is required to meet reclaimed water criteria. Disinfection, when properly administered, prevents waterborne diseases caused by bacteria, viruses, and amoebic cysts. The disinfection regulations for Class C reclaimed water require total coliform organisms not to exceed 23 per 100 milliliters. The design criteria are to provide sodium hypochlorite after the lagoon treatment to meet this coliform limit at the point of discharge into the storage ponds.

Design Data and Equipment Description

Table 5.1. Positive Displacement Flexible Tube Pumps

Name of Equipment:	Chemical Metering Pumps	
Location of Equipment	Effluent Pump Station	
Number of Units	2	
Function	Sodium Hypochlorite is injected into the influent side of either Effluent Pump 1 or 2. Mixing and disinfection occurs as the effluent is conveyed toStorage Pond 1 and Storage Pond No. 2.	
Flow Stream	Effluent from Settling Ponds.	
Operating Characteristics	Model	Watson Marlow 520UN/R2
	Tube Material	Marpene
	Tube Range	4.8 mm ID x 2..4mm wall thickness
	Speed	.0.1-220 RPM
	Nominal Flow Rate	0.38-830 mL/minute
Effect of Failure	Disinfection will not occur and Class C wastewater standards will not be met.	
Response Time/Action	Immediate	
Manufacturer Info	Watson-Marlow/ Bredel Pumps 37 Upton Technology Drive Wilmigton, MA 01887 Telephone: 800-282-8823 Fax: 978-658-0041	

Table 5.2. Hydraulic Membrane Pump		
Name of Equipment:	**Effluent Pump No 1**	
Location of Equipment	Effluent Pump Station/ Building	
Number of Units	1	
Function	Pump effluent from Settling Ponds to Storage Pond 1	
Flow Stream	Settled effluent	
Operating Characteristics	Model	Abel EM -50Z-GR Rev. 1
	Model Size	50
	Flow rate	50 GPM max
	Discharge Pressure	60 PSI
	Motor Supplies	5 HP, 3~/60 HZ/ 460 VAC, Inverted Duty
	Pump housing	Cast Iron
	Diaphragms	NBR
	Check Valve Balls	Polyurethane with Steel Core
	Check Valve Seats	Polyurethane
	Max solids Size	10 mm
	Number of Pump Chambers	2
	Weight	900 lbs
Effect of Failure	Significant reduction in storage capacity.	
Response Time/Action	Immediate.	
Manufacturer Info	Abel Pumps, L.P. 79 N Industrial Park 207 Overlook Dr Sewickly, Pensylvania, PA 15143 Telephone: 412-741-3222 Fax: 412-741-2599 Email: mail@abelpumps.com Internet: www.abelpumps.com	

Table 5.3. Hydraulic Membrane Pump		
Name of Equipment:	**Effluent Pump No 2**	
Location of Equipment	Effluent Pump Station/ Building	
Number of Units	1	
Function	Pump effluent from Settling Ponds and/ or Storage Pond 1 to Storage Pond 2	
Flow Stream	Settled Effluent	
Operating Characteristics	Model	Abel HMD-H-32-0250
	Flow Rate	50 GPM max
	Discharge Pressure	300 PSI
	Motor Supplies	20 HP, 3~/60 HZ/ 460 VAC, Inverted Duty
	Valve Pressure	406 PSIG
	Pump Housing	Nodular Cast Iron
	Molded Membranes	NBR
	Check Valve Balls	Polyurethane/ Steel Core
	Check Valve Seats	Stainless Steel Hardened
Effect of Failure	Significant reduction in storage capacity.	
Response Time/Action	Immediate.	
Manufacturer Info	Abel Pumps, L.P. 79 N Industrial Park 207 Overlook Dr Sewickly, Pensylvania, PA 15143 Telephone: 412-741-3222 Fax: 412-741-2599 Email: mail@abelpumps.com Internet: www.abelpumps.com	

Table 5.4. Storage Pond		
Name of Equipment:	Storage Pond 1	
Location of Equipment	Just East of Treatment Facility	
Number of Units	1	
Function	Storage Pond for treatment plant effluent, prior to land application	
Flow Stream	Treated Effluent	
Operating Characteristics	Pond	
	Length	212 feet
	Width	170 feet
	Depth	15 feet
	Freeboard	3 feet
	Liner	
	Material	60 mil textured HDPE geomembrane
Effect of Failure	Significant reduction in storage capacity.	
Response Time/Action	Immediate.	
Liner Manufacturer Info	Northwest Linings & Geotextile Products, Inc 21000 77th, Ave South Kent, Washington Telephone: 253-872-0244 Fax: 253-872-0245	

Table 5.5. Storage Pond		
Name of Equipment:	Storage Pond 2	
Location of Equipment	Land Application Site	
Number of Units	1	
Function	Storage Pond for treatment plant effluent, prior to land application	
Flow Stream	Treated Effluent	
Operating Characteristics	Pond	
	Length	312 feet
	Width	150 feet
	Depth	15 feet
	Freeboard	3 feet
	Liner	
	Material	60 mil textured HDPE geomembrane
Effect of Failure	Significant reduction in storage capacity.	
Response Time/Action	Immediate.	
Liner Manufacturer Info	Northwest Linings & Geotextile Products, Inc 21000 77th, Ave South Kent, Washington Telephone: 253-872-0244 Fax: 253-872-0245	

Operational Procedures

Following the settling process, the flows gravity to the Effluent Building, where they will be pumped to one of two Storage Ponds. Sodium hypochlorite will be injected into the stream to treat to Class C reclaimed water standards. The Storage Ponds will operate under one of three Normal Conditions, or under one of two Emergency Conditions. The Normal Operations are as follows: ***(1) Normal Operation-Storage Pond 1 Fill, (2) Normal Operation- Transition Months, and (3) Normal Operation- Storage Pond 2 Fill. The Emergency Conditions are as follows: (1) Emergency Operation 1, and (2) Emergency Operation 2.***

Normal Operation

Overview

The following describes the three normal conditions:

1. Normal Operation-Storage Pond 1 Fill, where effluent from the Settling Ponds will enter the Effluent Building the Chemical Metering Pump will inject sodium hypochlorite and Pump 1 will pump the flow to Storage Pond 1. This will typically operate from the months of December through March. The target operating principal is to store all winter flows in Storage Pond 1, due to freezing/winter conditions of the Storage Pond 2/ Land Application Site.
2. Normal Operation- Transition Months, where the effluent from the Settling Ponds will enter the Effluent Building, the Chemical Metering Pump will inject sodium hypochlorite and Pump 1 will pump the flow to Storage Pond 1. Concurrently, effluent from Storage Pond 1 will be withdrawn, sodium hypochlorite will be injected into the suction side of Pump 2 and the effluent will be conveyed to

Storage Pond 2. This will typically operate April and August until SP1 is empty. The target is to drain Storage Pond 1 in preparation for winter storage.

3. Normal Operation- Storage Pond 2 Fill, where effluent from the Settling Ponds will enter the Effluent Building, the Chemical Metering Pump will inject sodium hypochlorite and Pump 2 will pump the effluent to Storage Pond 2. This scenario will occur when SP-1 has been drained in preparation for winter storage. PMP-01 will be taken offline at this time. The target operating principal is to convey all effluent from the treatment facility to the irrigation system for land application.

Procedure- Normal Operation- Storage Pond 1 Fill

Please see the attached diagram 5a for the Storage Pond 1 Fill process flow and valve operating functions.

December-March: PMP-01 will be operating. PMP-02 will be off. Effluent flow from the Settling Ponds will be pumped to Storage Pond 1. CFR-01 will feed the suction line of PMP-01. The irrigation pump station will be off.

Procedure- Normal Operation- Storage Pond 2 Fill

Please see the attached diagram 5b for the Storage Pond 2 Fill process flow and valve operating functions.

.

August-November: PMP-02 will be operating. PMP-01 will be off. Effluent flow from Settiling Ponds will be pumped to Storage Pond 2. CFR-01 will feed the suction line of PMP-02. The irrigation pump station will be on

Procedure- Normal Operation- Transition Months

Please see the attached diagram 5c for the Storage Pond 2 Fill. Storage Pond 1 Drain process flow and valve operating functions.

April-August: PMP-01 will be operating. PMP-01 will pump effluent from the settling ponds to Storage Pond 1. PMP-02 will be operating. PMP-02 will pump effluent from Storage Pond 1 to Storage Pond 2. CFR-01 will feed the suction line of PMP-02. The irrigation pump station will be on.

Emergency Operations

Overview

The following describes the two Emergency Conditions:

1. Emergency Condition 1, where Pump 1 is off-line for repair or maintenance. Influent from the Settling Ponds will need to be pumped to Storage Pond1 or 2 using Pump 2.
2. Emergency Condition 2, where Pump 2 is off-line for repair or maintenance. Influent from the Settling Ponds will need to be pumped to Storage Pond1 using Pump 1.

Procedure- Emergency Operation 1

PMP-02 will be operating. PMP-01 will be off-line. Default to Normal Operation- Storage Pond 2 Fill or alternatively use Pump 2 to convey to Storage Pond 1.

Procedure- Emergency Operation 2

PMP-01 will be operating. PMP-02 will be off-line. Default to Normal Operation-Storage Pond 1 Fill. Effluent flow from the Settling Ponds will be pumped to Storage Pond 1.

Notice: During spring when Storage Pond 1 is nearing capacity, there will be limited availability for storage for Emergency Operation 2. A temporary pumping system, to convey effluent to Storage Pond 2 may be required while Pump 2 is off-line.

Storage Pond No. 1 Liquid Level Heights

Storage Pond 1 liquid level heights are correlated to the following storage volumes in the table below:

Table 5.6. Storage Pond 1 Liquid Level Heights

Liquid Level (feet)	Volume (million gallons)	Response
1	0.213	Normal Operation
2	0.411	Normal Operation
3	0.594	Normal Operation
4	0.764	Normal Operation
5	0.920	Normal Operation
6	1.063	Normal Operation
7	1.194	Normal Operation
8	1.314	Normal Operation
9	1.422	Normal Operation
10	1.519	Normal Operation
11	1.606	Normal Operation
12	1.684	Normal Operation
13	1.752	Normal Operation
14	1.812	Normal Operation
15	1.865	Max Storage Volume Default to Normal Operation- Storage Pond 2 Fill
16	1.909	Emergency Default to Normal Operation- Storage Pond 2 Fill
17	1.947	Emergency Default to Normal Operation- Storage Pond 2 Fill
18	1.978	Emergency Default to Normal Operation- Storage Pond 2 Fill

Storage Pond No. 2 Liquid Level Heights

Overview

Storage Pond 2 liquid level heights are correlated to the following storage volumes in the table below:

Table 5.7. Storage Pond 2 Liquid Level Heights

Liquid Level (feet)	Volume (million gallons)	Response
1	0.281	Normal Operation
2	0.543	Normal Operation
3	0.787	Normal Operation
4	1.014	Normal Operation
5	1.224	Normal Operation
6	1.417	Normal Operation
7	1.594	Normal Operation
8	1.756	Normal Operation
9	1.904	Normal Operation
10	2.037	Normal Operation
11	2.156	Normal Operation
12	2.262	Normal Operation
13	2.355	Normal Operation
14	2.437	Normal Operation
15	2.506	Max Storage Volume Increase flow to irrigation system and/ *or* Default to Normal Operation- Storage Pond 1 Fill
16	2.565	Emergency Increase flow to irrigation system and/ *or* Default to Normal Operation- Storage Pond 1 Fill
17	2.613	Emergency Increase flow to irrigation system and/ *or* Default to Normal Operation- Storage Pond 1 Fill
18	2.651	Emergency Increase flow to irrigation system and/ *or* Default to Normal Operation- Storage Pond 1 Fill

Instrumentation and Controls

Abbreviations

The following are abbreviations used in this section:

SCADA: Supervisory Control And Data Acquisition system

PLC: Programmable Logic Controller

HMI: Human Machine Interface

HOA:	Hand Off Auto
HOR:	Hand Off Remote
MCC:	Motor Control Center
OCA:	Open Close Auto
OCR:	Open Close Remote
OIT:	Operator Interface Terminal
OSC:	Open Stop Close
LCP:	Local Control panel
LOR:	Local Off Remote

Effluent Pump Station

Procedure- Manual Operation

1. A LOCKOUT/STOP switch is provided for each drive motor to allow operation and LOCKOUT at the equipment location.
2. HAND/OFF/REMOTE switches are provided at each drive motor starter at the MCC. The equipment runs in HAND, stop in OFF, and responds to the LCP in REMOTE.
3. HOA control elements are provided at the OIT and is enabled when the HOR is in REMOTE. The equipment runs in HAND, stop in OFF, and responds to the local PLC in AUTO.
4. A LEVEL automatic mode selector screen element is provided at the OIT. With the HOR in REMOTE and the HOA in AUTO, the screen runs under automatic level control in LEVEL.

Procedure- Automatic Operation

1. LOS is not in STOP.
2. HOR is in REMOTE and HOA is in AUTO.
3. Mode selection controls must be in LEVEL.
4. In LEVEL mode, the pump will start when the differential water level reaches an adjustable HIGH LEVEL setpoint. The pump continues to run until the differential level reaches an adjustable LOW LEVEL setpoint. The system is provided with timing, tuning, and sensor signal conditioning as required to filter transients in level signals caused by opening and closing valves, starting and stopping pumps, etc.

Procedure- Interlocks

All equipment will require manual reset following a fault related shutdown. Equipment operation is re-settable at the OIT.

1. Motor drives will shutdown if a sequence fault, overload, or phase fail is detected.
2. Motor drives will shutdown if a high pressure is detected.

Disinfection System

Procedure- Manual Operation

1. An OFF/STOP switch is provided with each pump to allow operation and LOCKOUT at the equipment location.

2. HAND/OFF/REMOTE switches are provided locally at each pump. The equipment will run in HAND, stop in OFF, and responds to the LCP in REMOTE.

Procedure- Automatic Operation

1. LOS is in STOP.
2. HOR is in REMOTE.
3. The pump is called to start its operating mode when an effluent pump starts.

Procedure- Interlocks

All equipment will require manual reset following a fault related shutdown. Equipment operation will be re-settable at the LCP.

1. System starts or stops if an effluent pump (user selectable choice) starts or stops.
2. Pump will shutdown if a sequence fault, overload, or phase fail is detected.
3. The pump will shutdown if a high pressure is detected.

Troubleshooting

Troubleshooting procedures for each piece of equipment can be found in specific equipment operation and maintenance manuals. Follow the equipment manufacturer recommendations for troubleshooting components for the Treatment System.

The tables below are for operators to assemble and log information as troubleshooting techniques are developed during operation of the facility.

Table 5.8. Hydraulic Membrane Pumps

Symptom	Possible Cause	Response
Sucking sound during pump#2 stroke	Ball Check or seat damaged	Replace ball and/or seat
Water leaking from pump#1outlet hose	Ruptured membrane	Replace membrane
Pump #1 loud metallic knock during pump stroke	Damaged ball check	Replace ball check
Servere vibration of pumping structure	Pulsation dampener	Shut down. Drain and refill pulsation dampener
Pump #1 Gear case oil appears milky color	Ruptured membrane	Replace membrane, drain and replace gear case oil

Table 5.9. Storage Ponds

Symptom	Possible Cause	Response

Section 6

Land Application System

Overview

The reuse water is pumped from the upper storage pond (Storage Pond #2) to an irrigation system during the months of April through October. The irrigation system components consist of spray type heads as typical in residential and commercial systems with valve boxes and distribution piping as required for the reuse system.

The irrigation pump station consists of a Grundfos Boosterpaq Hydro MPC-E system consisting of three vertical in-line multi stage 7.5 HP irrigation pumps located inside the irrigation pump station located at SP-2. Each pump is rated for 90 gpm at 206 feet of total dynamic head (TDH), each pump also has it's own VFD drive giving flexibility in operation ranges. Information on the irrigation pumps can be found in Table 6.2. The pumps are set below SP-2, connected to the storage lagoon to draw effluent through a 4-inch PVC pipe. The irrigation pump station houses the mechanical discharge piping and valves for the irrigation pump system, including check valves on each pump discharge. The irrigation flow meter is also housed inside this building. The irrigation pump station also houses the irrigation pump control panel, which provides manual (hand) operation of the irrigation pumps Information on the flow meter and control valves inside the irrigation pump station can be found in Table 6.1.

As mentioned in section 5 effluent is disinfected at two different places via diaphragm chemical metering pumps inside the effluent building by storage pond-1 and the settling ponds. A sodium hypochlorite solution is injected into the effluent being pumped from the settling ponds to Storage Pond-1. Effluent from storage pond-1 is then gravity fed back to the effluent building where it is injected with sodium hypochlorite solution again and pumped up to storage pond-2.

The land application site is presently forest land which has been thinned to minimize fire danger. The underbrush and grasses in this area are also kept down for the same reason.

The Land Application System operates under Municipal Wastewater Reuse Permit #M-221-02 issued by IDEQ on May 9, 2018 2018 (Appendix B). The land application system consists of five (5) Hydraulic Management Units (HMUs) covering a total of 20.49 acres. The irrigation areas are irrigated with underground feeder pipe and riser mounted sprinklers spaced at 80 foot intervals. Drawings showing the layout of the irrigation system are included in Appendix B.Design Data and Equipment Description

Table 6.1. Influent Flow Meters

Name of Equipment:	Siemans MAG 5100	
Location of Equipment	In the Irrigation Building (Irrigation Building)	
Number of Units	2	
Function	Flow sensor for influent flow.	
Flow Stream	Raw Wastewater	
Operating Characteristics	Nominal Size	100 mm (4")
	Liner Material	EPDM
	Ambient Temperature	-40° to 70°

	Operating Pressure	0.03 to 20 bar
	Material	Carbon Steel
	Liner	NBR Hard Rubber
Effect of Failure	Influent raw wastewater flow will not be measured.	
Response Time/Action	1 day	
Manufacturer Info	Siemens Corporation 153 East 53rd Street New York, NY 10022-4611 Telephone: 1-800-743-6367 Email: email.us@siemens.com Internet: www.usa.siemens.com	

Table 6.2. In-Line Vertical Multi-Stage Pumps		
Name of Equipment:	Irrigation Pump Station	
Location of Equipment	Land Application Site	
Number of Units	3	
Function	Pump stored effluent from Storage Pond 2 to the spray irrigation area.	
Flow Stream	Treatment Facility Effluent.	
Operating Characteristics	Model	Grundfos Boosterpaq Hydro MPC-E
		Controlled Booster System
	Flow Rate (GPM)	Varies
	Head	206 feet
	Size	7.5 HP
	Discharge Pressure	Varies
	Pump Housing	Cast Iron
	Impeller Material	Stainless Steel
	Max Ambient Temp	104° F
	Pie size Connection	2 inches
	Gross Weight	225 lbs.
Effect of Failure	Irrigation system will be temporarily unavailable. May potentially cause increase in stored volumes for Storage Ponds 1 and 2 and could cause an emergency condition.	
Response Time/Action	Immediate.	
Manufacturer Info	Grundfos Pumps Corporation 17100 West 118th Terrace Olathe, Kansas 66061 Telephone: 913-227-3400 Fax: 913-227-3500 Internet: www.grundfos.com	

Table 6.3. Irrigation Valves and Pipes	
Name of Equipment:	Irrigation Pipeline Components
Location of Equipment	Land Application System
Number of Units	Variable
Function	Irrigation Sprinkler System
Flow Stream	Treatment Facility Effluent.

Table 6.3. Irrigation Valves and Pipes			
Name of Equipment:	**Irrigation Pipeline Components**		
Operating Characteristics	Piping	Pressure	160 psi
		Size	2", 4"
	Eccentric	Plug Valve	
		Body Material	Cast Iron
		Seating Surface	Welded Nickel Overlay
	Air Vent Valve	Model	APCO #50
		Body	Cast Iron
		Cover	Cast Iron
	Sprinklers	Model	F33ASV, Single Nozzle with Vane
		Diameter	11/64"
		Pressure	55 psi
Effect of Failure	Irrigation system will be temporarily unavailable. May potentially cause increase in stored volumes for Storage Ponds 1 and 2 and could cause an emergency condition.		
Response Time/Action	Immediate.		
Manufacturer Info	Val-Matic Valve & Manufacturing Corporation 905 Riverside Drive Elmhurst, IL 60126 Phone: 630-941-7600 Fax: 630-941-8042 Email: valves@valmatic.com		
	APCO Willamette 1420 S. Wright Blvd Schaumburger, IL 60193 Telephone: 847-524-9000 Fax: 847-524-9007 Email: factory@apcovalves.com Internet: www.apcovalves.com		
	Nelson Irrigation Corporation 848 Airport Road Walla Walla, WA 99362 Telephone: 509-525-7660 Fax: 509-525-7907 Email: info@nelsonirrigation.com Internet: www.nelsonirrigation.com		

Operational Procedures

Overview

The reuse water is pumped from the upper storage pond (Storage Pond #2) to an irrigation system during the months of April through October. The irrigation system components consist of spray type heads as typical in residential and commercial systems with valve boxes and distribution piping as required for the reuse system.

The irrigation pump station consists of a Grundfos Boosterpaq Hydro MPC-E system consisting of three vertical in-line multi stage 7.5 HP irrigation pumps located inside the irrigation pump station located at SP-2. Each pump is rated for 90 gpm at 206 feet of total dynamic head (TDH), each pump also has it's own VFD drive giving flexibility in operation ranges. Information on the irrigation pumps can be found in Table 6.2. The pumps are set below SP-2, connected to the storage lagoon to draw effluent through a 4-inch PVC pipe. The irrigation pump station houses the mechanical discharge piping and valves for the irrigation pump system, including check valves on each pump discharge. The irrigation flow meter is also housed inside this building. The irrigation pump station also houses the irrigation pump control panel, which provides manual (hand) operation of the irrigation pumps Information on the flow meter and control valves inside the irrigation pump station can be found in Table 6.1.

As mentioned in section 5 effluent is disinfected at two different places via diaphragm chemical metering pumps inside the effluent building by storage pond-1 and the settling ponds. A sodium hypochlorite solution is injected into the effluent being pumped from the settling ponds to Storage Pond-1. Effluent from storage pond-1 is then gravity fed back to the effluent building where it is injected with sodium hypochlorite solution again and pumped up to storage pond-2.

The land application site is presently forest land which has been thinned to minimize fire danger. The underbrush and grasses in this area are also kept down for the same reason.

The Land Application System operates under Municipal Wastewater Reuse Permit #M-221-02 issued by IDEQ on May 9, 2018 2018 (Appendix B). The land application system consists of five (5) Hydraulic Management Units (HMUs) covering a total of 20.49 acres. The irrigation areas are irrigated with underground feeder pipe and riser mounted sprinklers spaced at 80 foot intervals. Drawings showing the layout of the irrigation system are included in Appendix B.

Operational Procedures:

It is critical that Land Application System operation be conducted in accordance with the Permit Limits and Conditions as listed in the current Reuse Permit. The Operator should be familiar with the requirements of the most current Permit for proper operation of the system. Copies of the 2018 Reuse Permit are included in Appendix B. Upon modification or renewal of the Permit, a new copy should be inserted in Appendix B.

Irrigation may only take place from April 1st through October 31st of each year as stipulated in the Permit. Irrigation below or substantially at the irrigation water requirement (IWR) of the crop is required.

For compliance purposes, the source of Pdef data used to calculate the IWR is based on information from the Mean Precipitation Deficit values from ET-Idaho website for Orchards – Apples and Cherries no ground cover and understory using Pdef data for Grass Pasture – high management. The data utilized is Coeur d'Alene station 1E (NWS – 101956).

Target monthly loading rates, based on calculated precipitation deficit and irrigation water requirements are:

Table 2-1: Target Hydraulic Loading

Month	Mean Irrigation Requirement (in/mo.)	Zone #1 4.11 acres (gal./mo.)	Zone #2 3.92 acres (gal./mo.)	Zone #3 4.81 acres (gal./mo.)	Zone #4 3.75 acres (gal./mo.)	Zone #5 3.90 acres (gal./mo.)
April	1.55	172,869	164,878	202,312	157,727	164,037
May	4.12	459,937	438,675	538,272	419,651	436,437
June	6.54	730,005	696,258	854,337	666,063	692,706
July	9.57	1,067,599	1,018,245	1,249,428	974,086	1,013,050
August	7.70	859,108	819,392	1,005,428	783,857	815,212
September	4.45	496,809	473,842	581,424	453,293	471,425
October	1.36	151,392	144,393	177,176	138,131	143,656
TOTAL	**35.29**	**3,937,718**	**3,755,683**	**4,608,376**	**3,592,809**	**3,736,521**

Table 2-2: Average Precipitation

Month	Average Total Precipitation (in)
April	2.47
May	2.67
June	1.95
July	1.06
August	0.89
September	1.10
October	2.60
TOTAL	**12.74**

NOTE: Data found in Table 2-2 is calculated based on Data from ET Idaho – Plummer 3WSW Data available at http://data.kimberly.uidaho.edu/ETIdaho/

Target loading rate for each month during the Growing Season is the average inches per month listed in Table 2-1, as Average Irrigation Water Requirement (IWR).

Precipitation is to be measured and recorded daily.

If total precipitation exceeds the average precipitation found in Table 2-2, the target loading rate should be adjusted accordingly. Example: Measured April precipitation is 2.75 inches; adjustment should be 2.75 inches actual minus 2.47 inches average = 0.28 inches over average. Target loading rates for April would then be: 1.55 inches average IWR less 0.28 inches above average precipitation = 1.27 inches IWR.

If during any month, the calculated IWR is exceeded due to above average precipitation occurring at a point during the month that does not allow sufficient time to make adjustments; the system will be considered to be in "substantial compliance".

If total precipitation is less than the average precipitation found in Table 2-2, the target loading rate may be adjusted accordingly. Example: Measured April precipitation is 2.00 inches; adjustment should be 2.47 inches average minus 2.00 inches actual = 0.47 inches below average precipitation. Target loading rates for April could then be: 1.46 inches average IWR plus 0.47 inches below average precipitation = 1.93 inches IWR.

Operational efforts should be made to "level load" the reuse irrigation site.

Loading five days per week, Monday through Friday, is an example of how the site might be loaded. This allows for two days resting for each week of irrigation.

Using this type of planning allows for weekend days to be used in the event that one or more week days cannot be used due to higher than normal precipitation, high wind, equipment failure, or other unplanned delays.

If greater than 0.5 inches of precipitation is measured, the site should be allowed to rest for a minimum of two (2) days.

If temperatures are running well above average and humidity levels are low, the site may be irrigated above the calculated daily planned loading rate.

If temperatures are running well below average and humidity levels are high, the site should be irrigated below the calculated daily planned loading rate.

Nitrogen loading limits must be considered, with adjustment of hydraulic loadings as appropriate to keep nitrogen loading below permitted levels.

Results from weekly groundwater monitoring piezometer measurements are to be taken into consideration, in addition to average IWR.

At all times, the minimum depth to groundwater must be three (3) feet below the ground surface before irrigation can occur.

Calculated distance to groundwater should be static or slightly increasing throughout the irrigation season.

If the calculated distance to groundwater begins to decrease, site evaluation may be required to determine if total on-site hydraulic loading is a contributing factor.

If on-site hydraulic loading is a contributing factor to a decrease in the distance to groundwater, as measured in the on-site monitoring piezometers, reuse irrigation should be discontinued until distance stabilizes or increases.

All reuse activity is to be under the direct control and direction of an appropriately Idaho State Licensed wastewater treatment and land application operator. There is no substitute for on-the-ground knowledgeable site specific observation when operating reuse facilities and BMP's should always be implemented.

All permit Section 4.5 "Other Permit Limits and Conditions", Section 8 "Standard Permit Conditions", Section 9 "General Permit Conditions" and Section 10 "Other Applicable Laws" apply.

In addition, the following general conditions must always be considered prior to irrigation:

Soil Moisture. At no time shall topsoil in the application areas be allowed to reach the saturation point. If extremely moist conditions exist, even if the saturation point has not yet been reached, no irrigation shall take place.

Weather. Weather conditions, past, present and forecast are to be considered. Irrigation shall not take place during or immediately after cool, wet weather. If forecasts indicate that unfavorable weather conditions are expected in the immediate future, irrigation shall be postponed until more favorable conditions persist.

Wind. Wind conditions are to be considered prior to irrigation. Even during periods of moderately windy conditions (5 to 15 mph), the wind direction is to be considered. If, in the judgment of the operator, the potential for spray drift onto private property or adjacent surface water exists, the system is not to be operated.

In accordance with the Permit, the median number of total coliform organisms in the effluent sampled at the sample tap at the end of the chlorine contact pipe shall not exceed 23 org./100 ml, and shall not exceed 230 org./100 ml in any confirmed sample, as determined from the bacteriological results of the last five (5) days for which analyses have been completed. Samples are required on a weekly basis when irrigation is taking place.

Chlorination is provided from a liquid Sodium Hypochlorite feed (high strength bleach) system with a chemical metering pump injector. A diaphragm metering pump with a manually adjustable flow rate of Sodium Hypochlorite is injected into the irrigation discharge piping from Settling pond 1 to Storage Pond 1 and again from Storage Pond 1 to Storage Pond 2. A free chlorine residual between 1.6 and 2.2 mg/l is desirable to achieve the total coliform disinfection levels specified by the Permit. Monitoring of the effluent for chlorine residual and total coliform bacteria will help the Operator minimize chlorine usage while maintaining an appropriate effluent quality. Both free and total chlorine should be measured and recorded daily.

Each gallon of fresh 12.5% bleach contains 1.0 pounds of available chlorine. As concentrations decrease so does the available chlorine. Common bleach purchased at the local grocery store is usually 5% concentrated and contains 0.4 pounds chlorine per gallon. High strength bleach is not suitable for long-term storage and should be used within 60 (sixty) days of purchase or will be reduced in strength. Common bleach is much more stable and can be stored for six months or longer without noticeable loss of strength. SODIUM HYPOCHLORITE IS A STRONG OXIDANT AND IS HARMFUL TO THE SKIN, EYES AND LUNGS. READ ALL MANUFACTURERS SAFETY PRECAUTIONS WHEN HANDLING THIS PRODUCT.

Following chlorination, the irrigation pump delivers chlorinated effluent through buried pressure mains to the irrigation areas. A flow meter installed in the irrigation pump station measures the volume of flow delivered to the land application site.

The Irrigation Control Panel located inside the Irrigation Pump Station controls the irrigation pumping system. The pumps are operated manually. The operator is required to manually turn on and off the pumps when the desired hydraulic loading has been reached.

During the non-application months, the main control switch as well as all local switches should be in the “off” position.

b.) Filling the Irrigation Pipeline

The procedure for filling the irrigation pipeline is as follows:

Close all drain valves along the distribution system.

Choose one hydraulic management unit zone valve to leave open. Close the rest.

Reset the flow meter to zero.

Open the valve between the pump and the storage lagoon to provide the pump with stored effluent.

Open bleed screw for each pump until only a small trickle of water is released then tighten.

At the panel turn the disconnect switch to on. The panel display will turn on and the pumps will cycle for a brief second.

Using the arrow soft keys, toggle to the “Operation” tab while looking at the display.

Using the up arrow soft key select operating mode “Normal” and press the “ok” soft key.

The pumps will slowly start and begin to fill the line.

A discharge pressure of 25 psi must be maintained for the pumps to continue filling the line. If this pressure is not maintained the low-pressure limit control will shut down the pumps.

This will occur many times and will require the operator the clear and reset the alarm until the pump discharge pressure of 25 psi is reached.

c.) Shutting Down the Irrigation System

The procedure to shut down the irrigation system depends on the length of time the shutdown exists. A general rule is if the shutdown is longer than one week, the irrigation pipeline should be drained to prevent biological action within the pipeline from creating hazardous and corrosive conditions.

The procedure to shut down irrigation system is as follows:

Set pump disconnect switch to “off”.

Close valve between the pump and storage lagoon.

Open all valves controlling hydraulic management unit zones.

Open all drain valves along distribution line.

Return to the valve between the pump and storage lagoon and open the nearby drain valve.

Instrument and Controls

Abbreviations

The following are abbreviations used in this section:

SCADA:	Supervisory Control And Data Acquisition system
PLC:	Programmable Logic Controller
HMI:	Human Machine Interface
HOA:	Hand Off Auto
HOR:	Hand Off Remote
MCC:	Motor Control Center
OCA:	Open Close Auto
OCR:	Open Close Remote
OIT:	Operator Interface Terminal
OSC:	Open Stop Close
LCP:	Local Control panel
LOR:	Local Off Remote

Irrigation Pump Station

Procedure- Manual Operation

1. A LOCKOUT/STOP switch is provided for the pump station.
2. HAND/OFF/REMOTE switches will be provided for the pump station. The equipment will run in HAND, stop in OFF, and will respond to the LCP in REMOTE.

Procedure- Automatic Operation

1. LOS will not be in STOP.
2. HOR will be in REMOTE.

Procedure- Interlocks

All equipment will require manual reset following a fault related shutdown. Equipment operation will be re-settable at the LCP.

1. Pump station will be shutdown if a sequence fault, overload, or phase fail is detected.
2. Pump station will be shutdown if a high or low pressure is detected.

Troubleshooting

Troubleshooting procedures for each piece of equipment can be found in the specific equipment operation and maintenance manuals. Follow the equipment manufacturer recommendations for troubleshooting components for the Treatment System.

The tables below are for operators to assemble and log information as troubleshooting techniques are developed during operation of the facility.

Table 6.4. Irrigation Pump Station		
Symptom	Possible Cause	Response

Table 6.5. Flowmeter		
Symptom	Possible Cause	Response

Table 6.6. Irrigation Piping, Fittings, Sprinklers and Supports		
Symptom	Possible Cause	Response

Table 6.7. Electrical Equipment		
Symptom	Possible Cause	Response

Odor Management

Lagoons:

Lagoon odors are best controlled by maintaining adequate aeration in the aeration lagoons. If an odor complaint is received, and determined to be originating from the lagoons, D.O. levels should be checked immediately and appropriate adjustments made. Increasing aeration time and/or the number of diffusers operating, as detailed in Section 2.2, should increase D.O. levels.

The excessive build-up of solids from organically overloading the lagoons may also cause odors. Monitoring of solids build-up and identifying potential sources of overloading, as described in Section 2.5 should take place.

Land Application:

Odors can be generated during wastewater irrigation when dissolved oderous gasses are released into the air or when fine effluent droplets evaporate, releasing gasses into the atmosphere. Appropriate buffers between irrigation and inhabited dwellings, as specified in the Reuse Permit, help protect neighboring property owners from objectionable odors. Maintaining the forest vegetation within these buffers will provide a wind break, reducing the potential for drift and odors.

Weather conditions that affect drift and odor include wind speed, wind direction, temperature, relative humidity and atmospheric stability. Interaction of these conditions can be complicated and can affect drift and odor in a number of ways, which are usually site specific. Generally, it is recommended that spray irrigation of wastewater take place under low wind (less than 5 mph) conditions and after mid-morning. The Operator should take note as to how varying weather conditions affect drift and odors, and make adjustments to irrigation practices and schedules accordingly.

Responding to Odor Complaints

If the Operator or HSP receive an odor complaint, they should immediately take steps to determine the source of the odor (i.e. the irrigation system, lagoons, collection system or lift station). Depending on the source of the odors, immediate steps should be taken, such as shutting down the irrigation system, until weather conditions change. Other sources of odors may take additional time and investigation to determine the cause and determine if they are due to normal operating procedures in need of modification; operational procedures not being followed; an upset in the treatment system; or a leak in the collection system.

If IDEQ receives an odor complaint, they will generally follow the procedures outlined in the *Idaho Department of Environmental Quality Procedures for Responding to Odor Complaints*.

Runoff Management

The land application site generally slopes from north to south and as such may be susceptible to runoff during high precipitation events or if the land application rates are increased beyond the site's ability to retain the water.

Because the site is sloped, runoff from the land application site is not acceptable at this location. When runoff does occur, the land application system (or zone) must be turned off and the site (or zone) evaluated to determine the reason for the runoff. Although runoff typically occurs from an inability to retain the moisture applied, the system should be inspected for a potential leak or other cause that is in the operator's control to repair. The operator should also review the operations logs to determine if the site (or a specific zone) has received more application than it should. If possible, the zone should be isolated until the cause of the runoff is identified or the high precipitation event is over.

Silviculture Management

The Silviculture Plan prepared as part of the Reuse Application Technical Report (Appendix A) developed a list of recommendations for this site to be healthy and available for land application. An annual inspection of the site and the silviculture plan is required to confirm the availability of the land application for the following year. An addenda to the Silviculture Plan should be prepared for each permit cycle.

The site may require yearly maintenance to sustain for land application. Each year during the annual inspection, a brief site maintenance plan should be developed and executed for the site. Some key features of the Silviculture Plan that should be reviewed throughout the land application cycle and during the annual maintenance planning are reiterated below.

1. Removal of all debris shortly after cutting.
2. Trees should be thinned to maintain a low canopy.
3. Thinning should be selective to the considerations identified in the Silviculture Plan (i.e., health, crown density and size, etc.)
4. Manage for an all age and mixed species stand. Selective harvesting and planting should work towards that end.
5. Control noxious weeds.

Section 7

Non-Process System

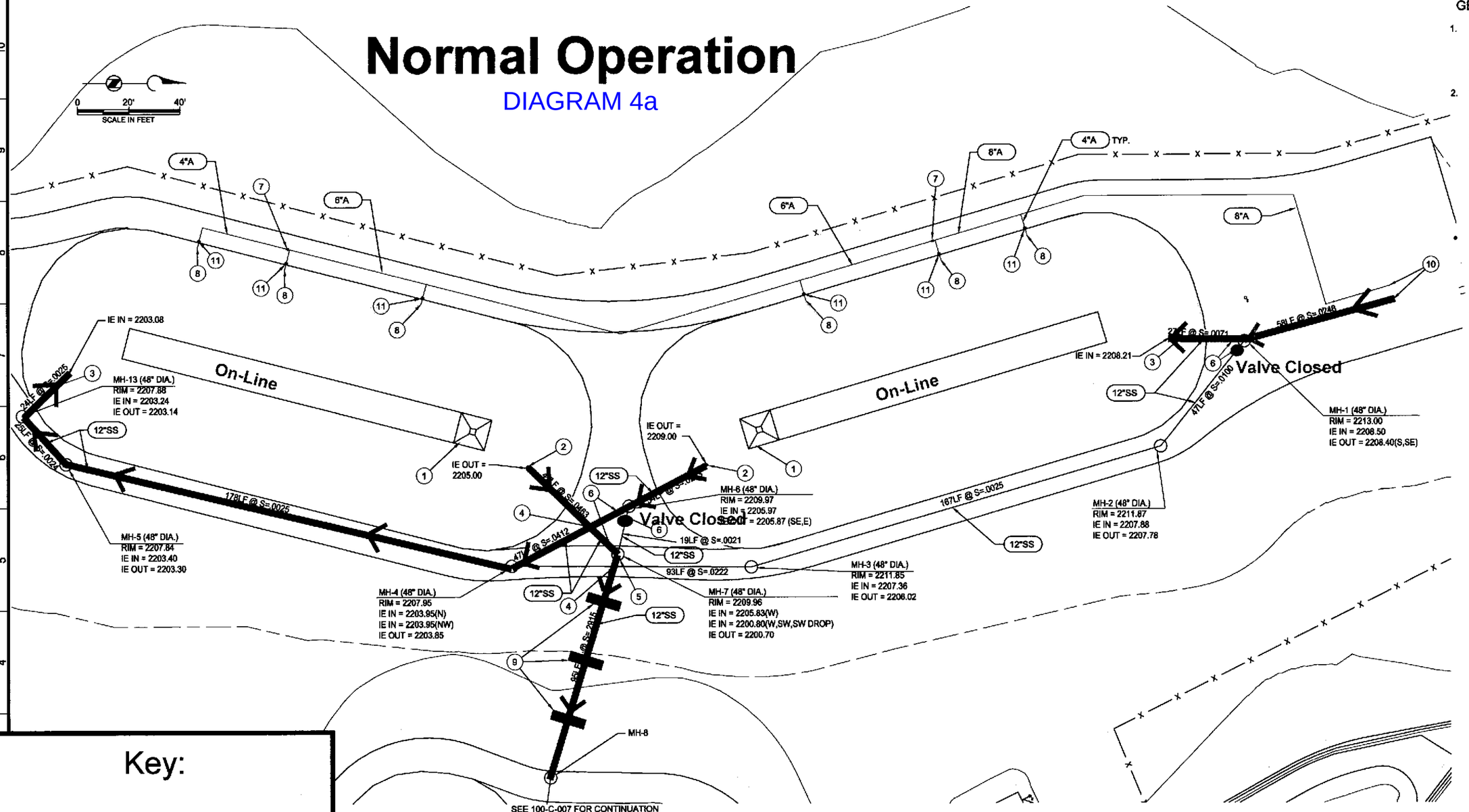
Overview

Non-process systems comprise of all systems peripheral to the wastewater treatment system such as the potable water distribution system. All operations and maintenance information is located in the equipment specific operations and maintenance manuals.

Diagrams

Normal Operation

DIAGRAM 4a



GENERAL NOTES:

1. PIPING LAYOUT MAY BE MODIFIED BY ENGINEER IN THE FIELD TO PROVIDE EXPANDED UNDER DRAIN AREA DUE TO UNKNOWN UNDER GROUND CONDITIONS.
2. CONTRACTOR SHALL PROVIDE VIDEO INSPECTION OF UNDER DRAIN AFTER PLACEMENT OF SAND AND PRIOR TO INSTALLATION OF LINER TO VERIFY CONDITION OF DRAIN LINES AND CORRECT AS NECESSARY.

KEY NOTES:

1. LEAK DETECTION SUMP, SEE DWG A/000-C-012.
2. POND OUTLET STRUCTURE, SEE DETAIL B/000-C-014.
3. POND INLET STRUCTURE, SEE DETAIL C/000-C-014.
4. PIPE CROSSING, SEE DETAIL D/000-C-008 FOR PIPE CUSHION WHERE VERTICAL CLEARANCE <6".
5. SEWER MANHOLE WITH OUTSIDE DROP CONNECTION, SEE DETAIL C/000-C-005.
6. 2-PIECE CAST IRON VALVE BOX AND PLUG VALVE.
7. REDUCER.
8. AIR DIFFUSER FLANGE CONNECTION COUPLING, SEE DETAIL D/000-C-014.
9. CDF OR CONCRETE CHECK DAM, SEE DETAIL E/000-C-008, MAXIMUM 36-FT CENTER TO CENTER ON GRADES 20 TO 35 PERCENT, 24-FT CENTER TO CENTER ON GRADES 35 TO 50 PERCENT.
10. COORDINATE POINT OF CONNECTION WITH DWG 100-M-001.
11. WAFER STYLE BUTTERFLY VALVE.

Key:

Wastewater Flow Path

Closed Valves

Note: All other valves shown are Normally Open

EXTERNAL REFERENCE FILES
- 133937-BASE OPT2.dwg
- 133937-TBK-1000.dwg
- Yard Piping.dwg

PROFESSIONAL ENGINEER REGISTERED 11908 STATE OF IDAHO DEAN P. SMITH

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	0	CONFORMED DOCUMENT SET	SDC	2-13-09	DPS

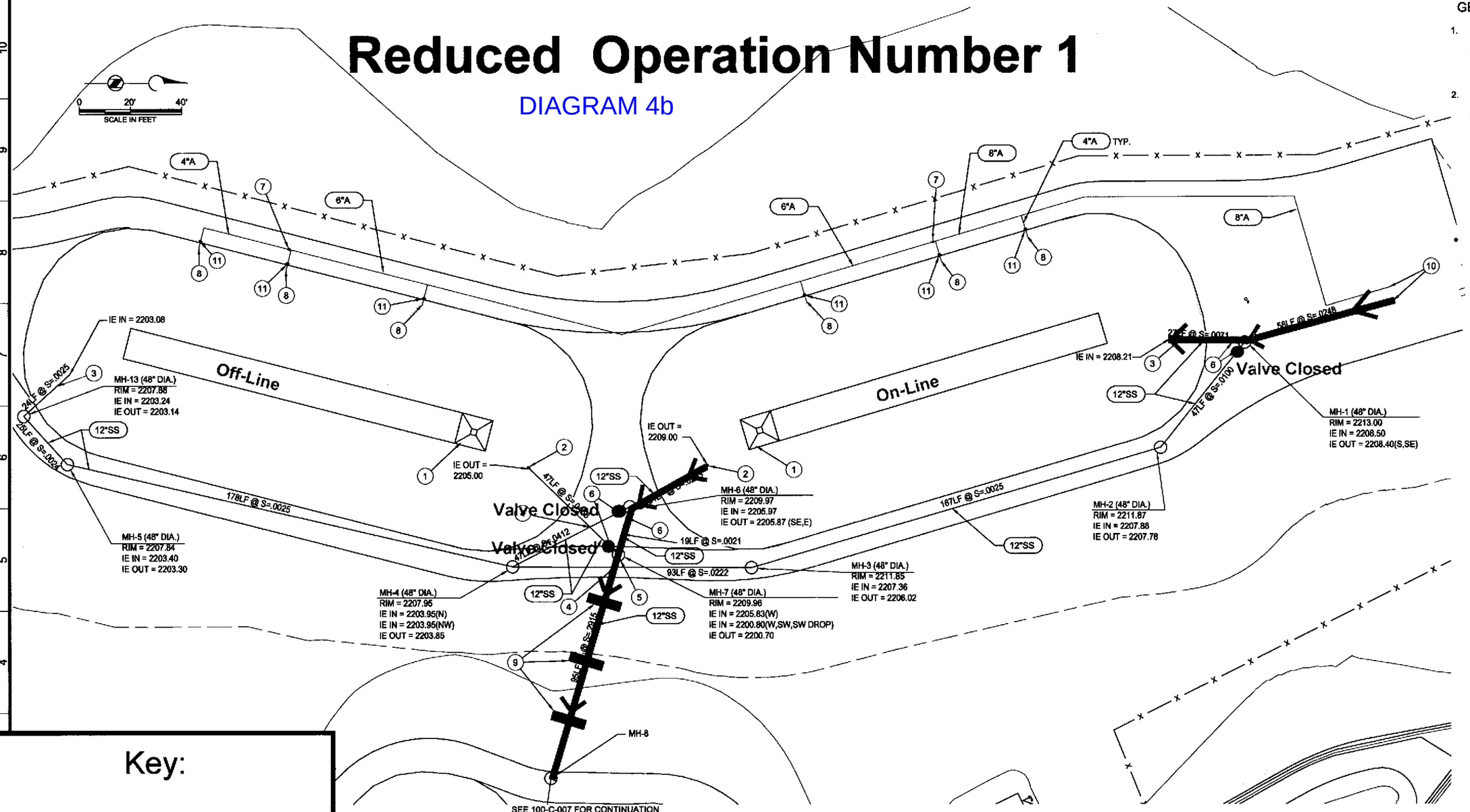
IDAHO DEPARTMENT OF PARKS AND RECREATION

HEYBURN STATE PARK
CENTRAL SEWAGE COLLECTION AND TREATMENT SYSTEM
CIVIL
TREATMENT POND
PROCESS PIPING PLAN

FILENAME	133937-100-C-005.dwg
BC PROJECT NUMBER	133937
CLIENT PROJECT NUMBER	310870
DRAWING NUMBER	100-C-005
SHEET NUMBER	27 OF 110

Reduced Operation Number 1

DIAGRAM 4b



GENERAL NOTES:

1. PIPING LAYOUT MAY BE MODIFIED BY ENGINEER IN THE FIELD TO PROVIDE EXPANDED UNDER DRAIN AREA DUE TO UNKNOWN UNDER GROUND CONDITIONS.
2. CONTRACTOR SHALL PROVIDE VIDEO INSPECTION OF UNDER DRAIN AFTER PLACEMENT OF SAND AND PRIOR TO INSTALLATION OF LINER TO VERIFY CONDITION OF DRAIN LINES AND CORRECT AS NECESSARY.

KEY NOTES:

1. LEAK DETECTION SUMP, SEE DWG A/000-C-012.
2. POND OUTLET STRUCTURE, SEE DETAIL B/000-C-014.
3. POND INLET STRUCTURE, SEE DETAIL C/000-C-014.
4. PIPE CROSSING, SEE DETAIL D/000-C-008 FOR PIPE CUSHION WHERE VERTICAL CLEARANCE <6".
5. SEWER MANHOLE WITH OUTSIDE DROP CONNECTION, SEE DETAIL C/000-C-005.
6. 2-PIECE CAST IRON VALVE BOX AND PLUG VALVE.
7. REDUCER.
8. AIR DIFFUSER FLANGE CONNECTION COUPLING, SEE DETAIL D/000-C-014.
9. CDF OR CONCRETE CHECK DAM, SEE DETAIL E/000-C-008, MAXIMUM 36-FT CENTER TO CENTER ON GRADES 20 TO 35 PERCENT, 24-FT CENTER TO CENTER ON GRADES 35 TO 50 PERCENT.
10. COORDINATE POINT OF CONNECTION WITH DWG 100-M-001.
11. WAFER STYLE BUTTERFLY VALVE.

Key:

Wastewater Flow Path

Closed Valves

Note: All other valves shown are Normally Open

CONFORMED DOCUMENT - THIS DOCUMENT WAS COMPILED FROM ALL BID PERIOD INFORMATION RELATIVE TO THIS SHEET. THE ENGINEER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION HEREIN. THE ORIGINAL BID DOCUMENTS ARE THE CONTRACTUAL DOCUMENTS FOR THIS PROJECT AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UPDATE THOSE DOCUMENTS AS NECESSARY TO KEEP AN ACCURATE RECORD OF THE CONSTRUCTION. ORIGINAL DRAWINGS SIGNED BY THE DESIGN ENGINEER. CONFORMED DRAWINGS STAMPED AND SIGNED BY THE PROJECT MANAGER.

EXTERNAL REFERENCE FILES
133937-BASE OPT2.dwg
133937-TBK-1000.dwg
Yard Piping.dwg

PROFESSIONAL ENGINEER REGISTERED 11908 STATE OF IDAHO DEAN P. SMITH

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	0	CONFORMED DOCUMENT SET	SDC	2-13-09	DPS

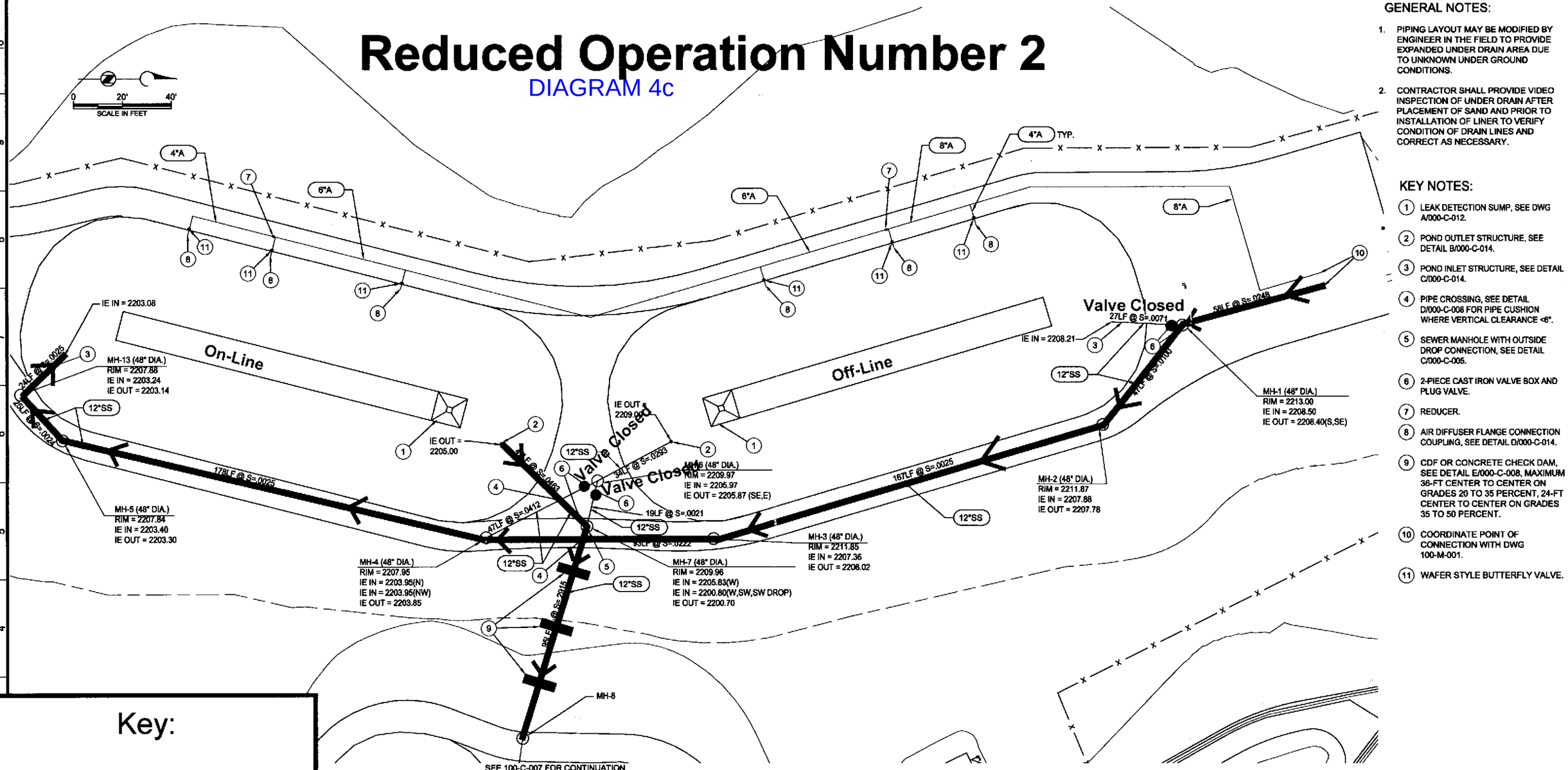
IDAHO DEPARTMENT OF PARKS AND RECREATION

HEYBURN STATE PARK
CENTRAL SEWAGE COLLECTION AND TREATMENT SYSTEM
CIVIL
TREATMENT POND
PROCESS PIPING PLAN

FILENAME	133937-100-C-005.dwg
BC PROJECT NUMBER	133937
CLIENT PROJECT NUMBER	310870
DRAWING NUMBER	100-C-005
SHEET NUMBER	27 OF 110

Reduced Operation Number 2

DIAGRAM 4c



GENERAL NOTES:

1. PIPING LAYOUT MAY BE MODIFIED BY ENGINEER IN THE FIELD TO PROVIDE EXPANDED UNDER DRAIN AREA DUE TO UNKNOWN UNDER GROUND CONDITIONS.
2. CONTRACTOR SHALL PROVIDE VIDEO INSPECTION OF UNDER DRAIN AFTER PLACEMENT OF SAND AND PRIOR TO INSTALLATION OF LINER TO VERIFY CONDITION OF DRAIN LINES AND CORRECT AS NECESSARY.

KEY NOTES:

1. LEAK DETECTION SUMP, SEE DWG A/000-C-012.
2. POND OUTLET STRUCTURE, SEE DETAIL B/000-C-014.
3. POND INLET STRUCTURE, SEE DETAIL C/000-C-014.
4. PIPE CROSSING, SEE DETAIL D/000-C-008 FOR PIPE CUSHION WHERE VERTICAL CLEARANCE <6".
5. SEWER MANHOLE WITH OUTSIDE DROP CONNECTION, SEE DETAIL C/000-C-005.
6. 2-PIECE CAST IRON VALVE BOX AND PLUG VALVE.
7. REDUCER.
8. AIR DIFFUSER FLANGE CONNECTION COUPLING, SEE DETAIL D/000-C-014.
9. CDF OR CONCRETE CHECK DAM, SEE DETAIL E/000-C-008, MAXIMUM 36-FT CENTER TO CENTER ON GRADES 20 TO 35 PERCENT, 24-FT CENTER TO CENTER ON GRADES 35 TO 50 PERCENT.
10. COORDINATE POINT OF CONNECTION WITH DWG 100-M-001.
11. WAFER STYLE BUTTERFLY VALVE.

Key:

Wastewater Flow Path

Closed Valves

Note: All other valves shown are Normally Open

EXTERNAL REFERENCE FILES
133937-BASE OPTZ.dwg
133937-TBK-1000.dwg
Yard Piping.dwg

PROFESSIONAL ENGINEER REGISTERED 11908 STATE OF IDAHO DEAN P. SMITH

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	0	CONFORMED DOCUMENT SET	SDC	2-13-09	DPS

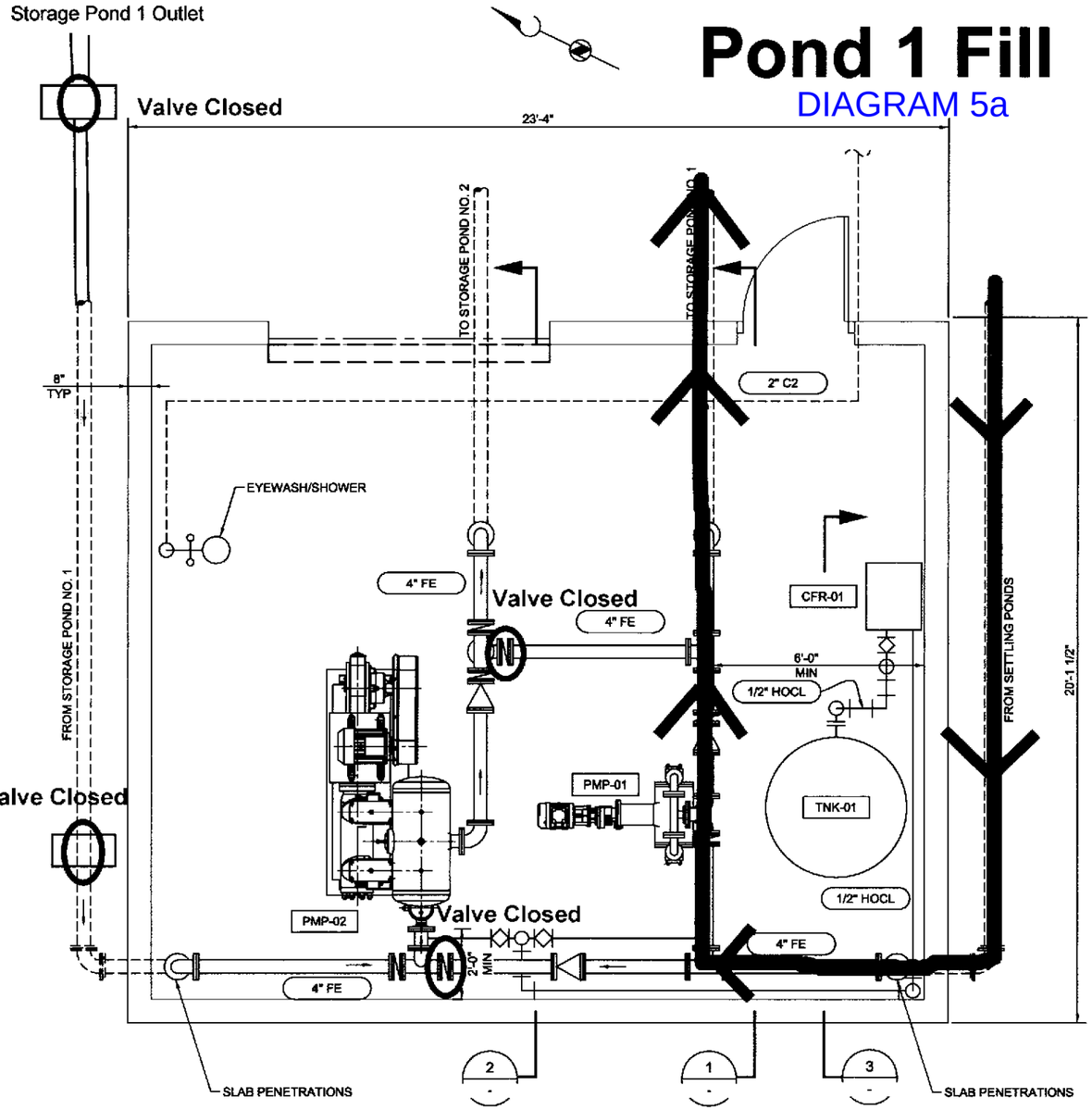
IDAHO DEPARTMENT OF PARKS AND RECREATION

HEYBURN STATE PARK
CENTRAL SEWAGE COLLECTION AND TREATMENT SYSTEM
CIVIL
TREATMENT POND
PROCESS PIPING PLAN

FILENAME	133937-100-C-005.dwg
BC PROJECT NUMBER	133937
CLIENT PROJECT NUMBER	310870
DRAWING NUMBER	100-C-005
SHEET NUMBER	27 OF 110

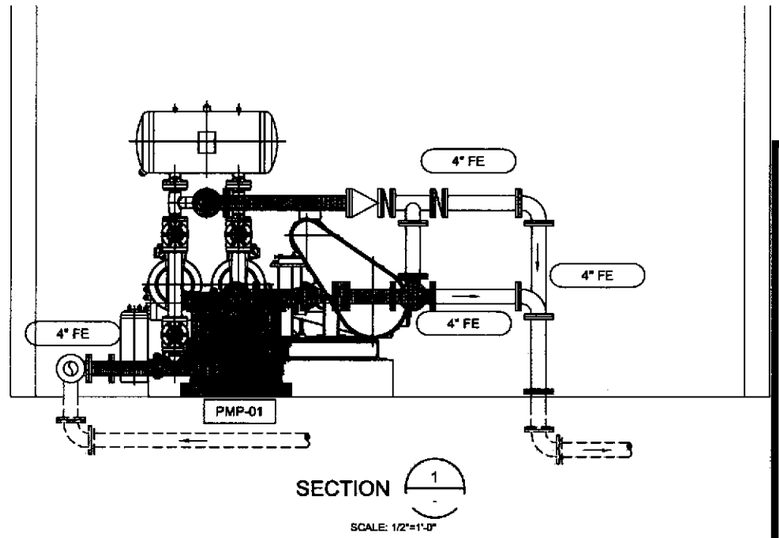
Pond 1 Fill

DIAGRAM 5a



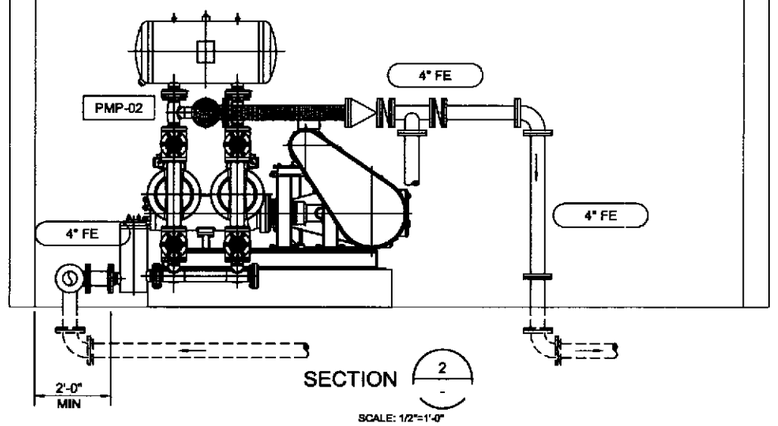
PLAN

SCALE: 1/2" = 1'-0"



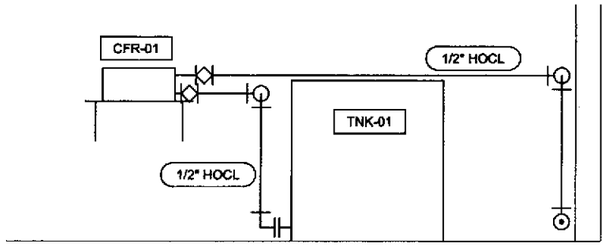
SECTION 1

SCALE: 1/2"=1'-0"



SECTION 2

SCALE: 1/2"=1'-0"



SECTION 3

SCALE: 1/2"=1'-0"

Key:

- Wastewater Flow Path
- Closed Valves
- Added Valve

Note: All other valves shown are Normally Open

CONFORMED DOCUMENT - THIS DOCUMENT WAS COMPILED FROM ALL BID PERIOD INFORMATION RELATIVE TO THIS SHEET. THE ENGINEER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION HEREIN. THE ORIGINAL BID DOCUMENTS ARE THE CONTRACTUAL DOCUMENTS FOR THIS PROJECT AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UPDATE THOSE DOCUMENTS AS NECESSARY TO KEEP AN ACCURATE RECORD OF THE CONSTRUCTION. ORIGINAL DRAWINGS SIGNED BY THE DESIGN ENGINEER. CONFORMED DRAWINGS STAMPED AND SIGNED BY THE PROJECT MANAGER.

BROWN AND CALDWELL
BOISE, IDAHO

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: SPW
DRAWN: SDC
CHECKED: DPS
CHECKED: SPW
APPROVED: SPW/DPS

EXTERNAL REFERENCE FILES
- 08-224 base_PSR.dwg
- 133937-Mech-Base.dwg
- 133937-TSK-1000.dwg
- HVAC-EPS_BLDG.dwg

PROFESSIONAL ENGINEER REGISTERED 11908 STATE OF IDAHO DEAN P. SMITH

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	0	CONFORMED DOCUMENT SET	SDC	2-13-09	DPS

IDAHO DEPARTMENT OF PARKS AND RECREATION

HEYBURN STATE PARK
CENTRAL SEWAGE COLLECTION AND TREATMENT SYSTEM
MECHANICAL
EFFLUENT PUMP STATION
PLANS AND DETAIL

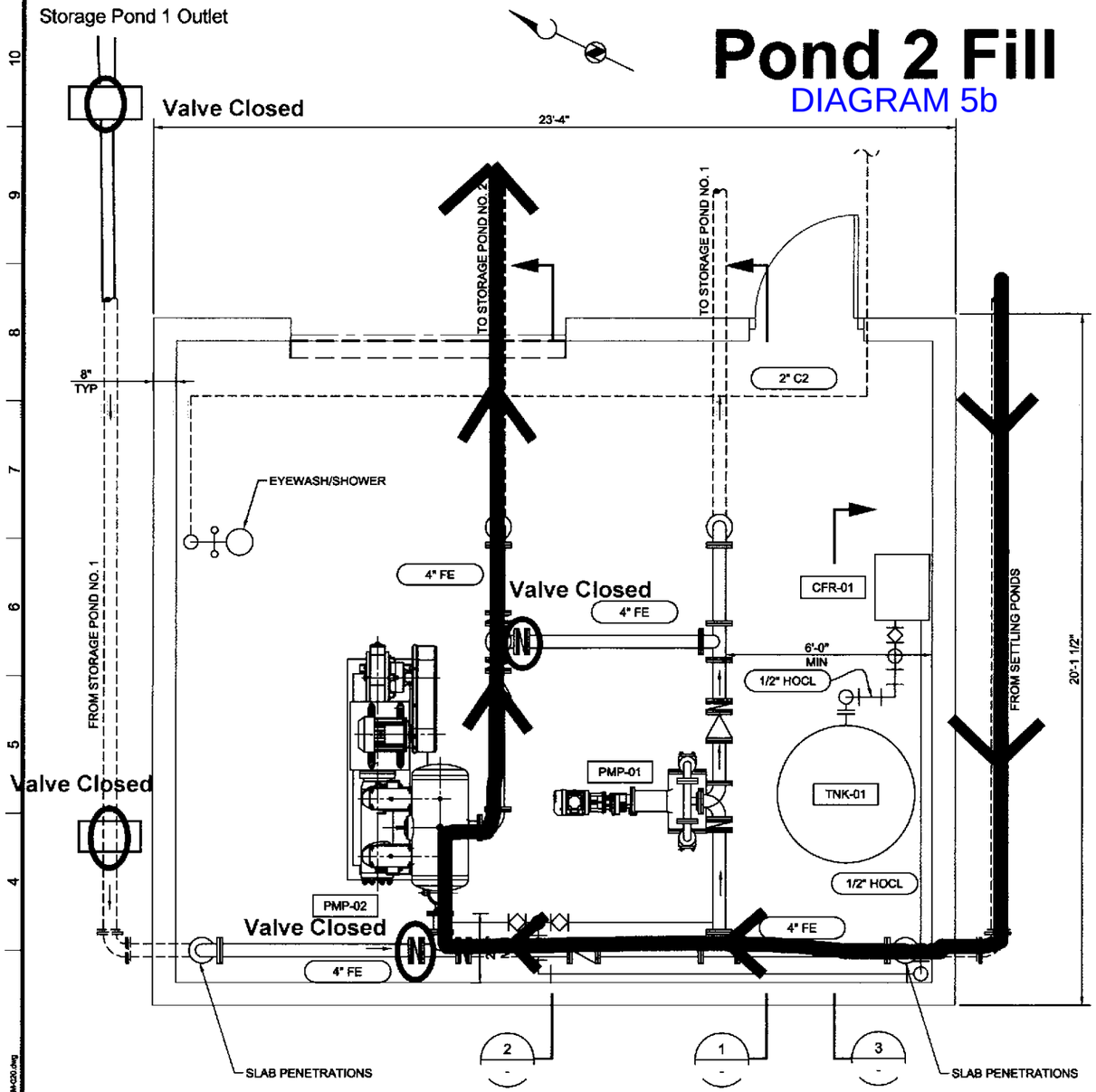
FILENAME 133937-100-M-020
BC PROJECT NUMBER 133937
CLIENT PROJECT NUMBER 310870
DRAWING NUMBER 100-M-020
SHEET NUMBER 89 OF 110

JUNE, 2008

SCOTT
Feb 12, 2009 - 2:27pm
I:\Brown & Caldwell\projects\133937.200\dwg_DATA\Sheets\M-Mechanical\133937-100-M-020.dwg
IDPR.bmp

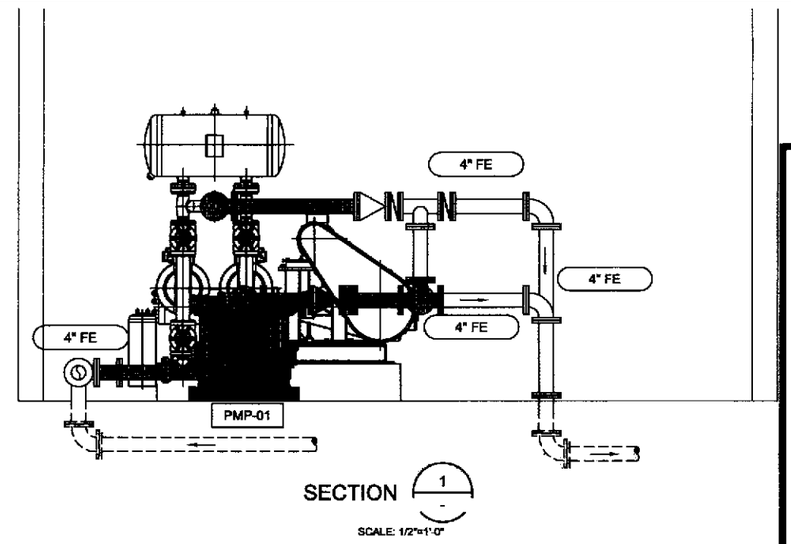
Pond 2 Fill

DIAGRAM 5b



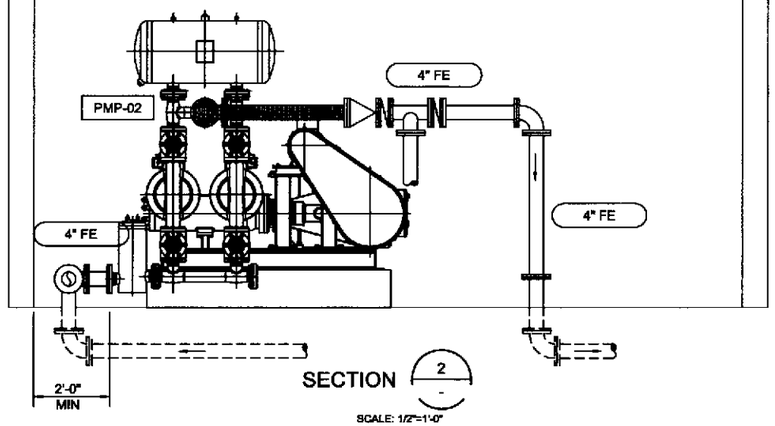
PLAN

SCALE: 1/2" = 1'-0"



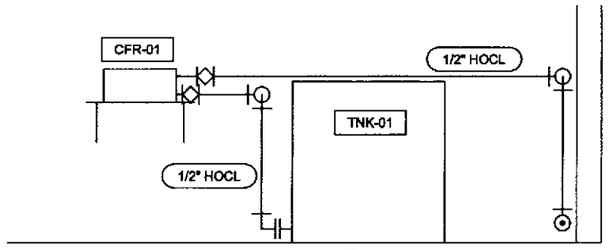
SECTION 1

SCALE: 1/2"=1'-0"



SECTION 2

SCALE: 1/2"=1'-0"



SECTION 3

SCALE: 1/2"=1'-0"

Key:

- Wastewater Flow Path
- Closed Valves
- Added Valve

Note: All other valves shown are Normally Open

CONFORMED DOCUMENT - THIS DOCUMENT WAS COMPILED FROM ALL BID PERIOD INFORMATION RELATIVE TO THIS SHEET. THE ENGINEER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION HEREIN. THE ORIGINAL BID DOCUMENTS ARE THE CONTRACTUAL DOCUMENTS FOR THIS PROJECT AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UPDATE THOSE DOCUMENTS AS NECESSARY TO KEEP AN ACCURATE RECORD OF THE CONSTRUCTION. ORIGINAL DRAWINGS SIGNED BY THE DESIGN ENGINEER. CONFORMED DRAWINGS STAMPED AND SIGNED BY THE PROJECT MANAGER.

BROWN AND CALDWELL
BOISE, IDAHO

SUBMITTED: _____ DATE: _____ PROJECT MANAGER

APPROVED: _____ DATE: _____ BROWN AND CALDWELL

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: SPW
DRAWN: SDC
CHECKED: DPS
CHECKED: SPW
APPROVED: SPW/DPS

EXTERNAL REFERENCE FILES
08-224 base PSR.dwg
133937-Mech-Base.dwg
133937-TBK-1000.dwg
HVAC-EPS_BLDG1.dwg

PROFESSIONAL ENGINEER REGISTERED 11908 STATE OF IDAHO DEAN P. SMITH

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	0	CONFORMED DOCUMENT SET	SDC	2-13-09	DPS

IDAHO DEPARTMENT OF PARKS AND RECREATION

HEYBURN STATE PARK
CENTRAL SEWAGE COLLECTION AND TREATMENT SYSTEM
MECHANICAL
EFFLUENT PUMP STATION
PLANS AND DETAIL

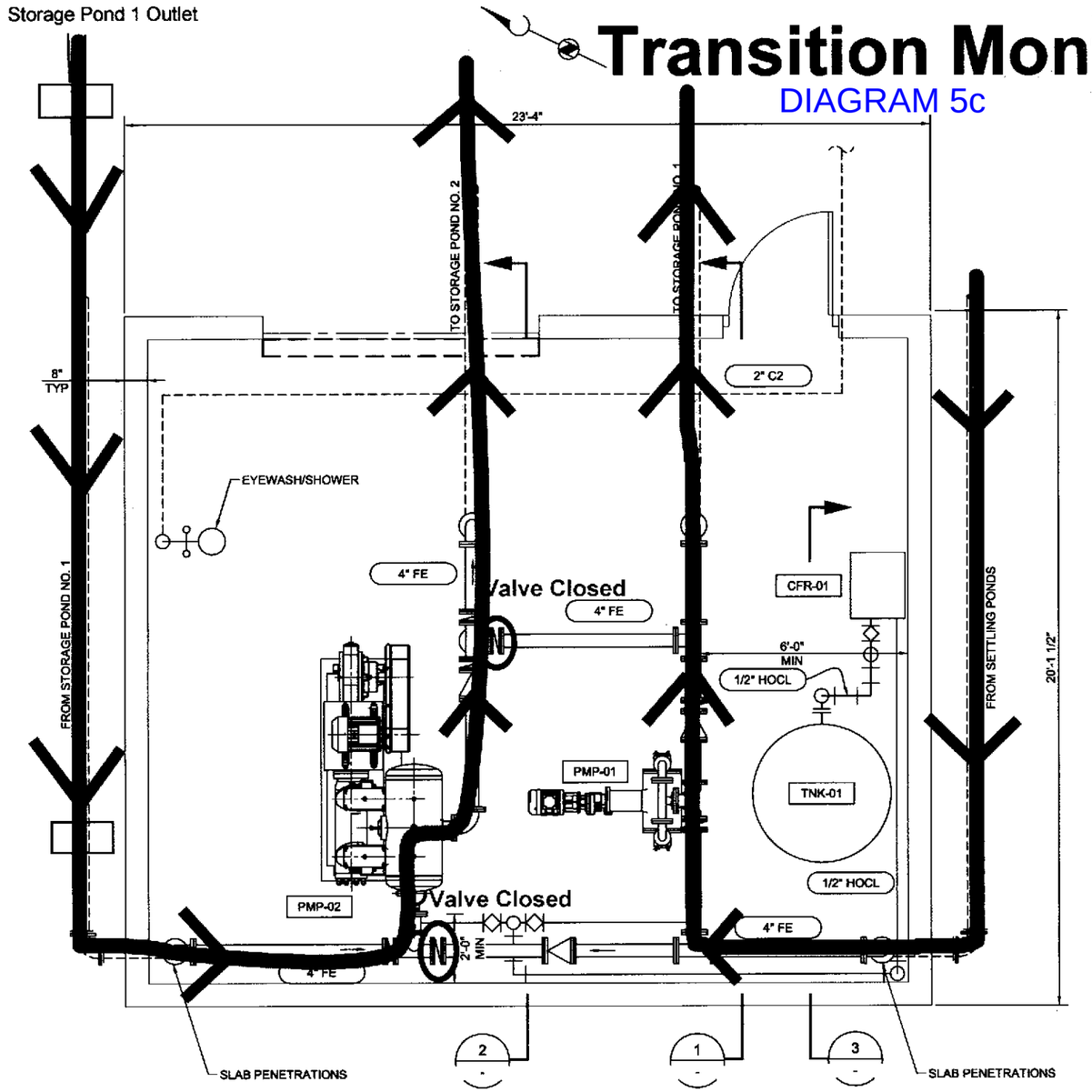
FILENAME	133937-100-M-020
BC PROJECT NUMBER	133937
CLIENT PROJECT NUMBER	310870
DRAWING NUMBER	100-M-020
SHEET NUMBER	89 OF 110

JUNE, 2008

Feb 12, 2009 - 2:27pm SCOTT
L:\brown & caldwell\projects\133937.2008\dwg_DAD\2-Sheets\M-Mechanical\133937-100-M-020.dwg
IDPR.bmp

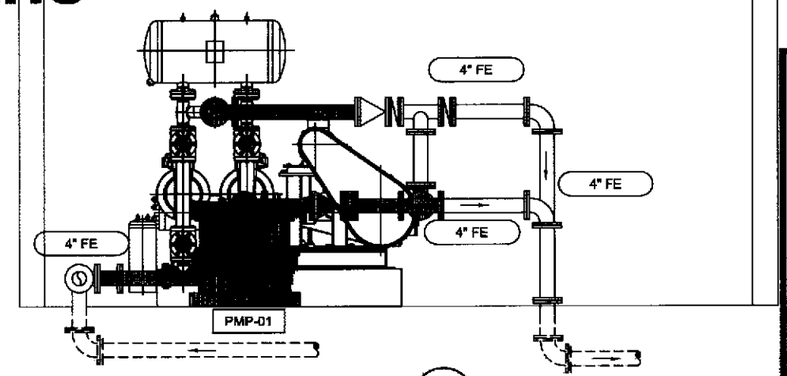
Transition Months

DIAGRAM 5c



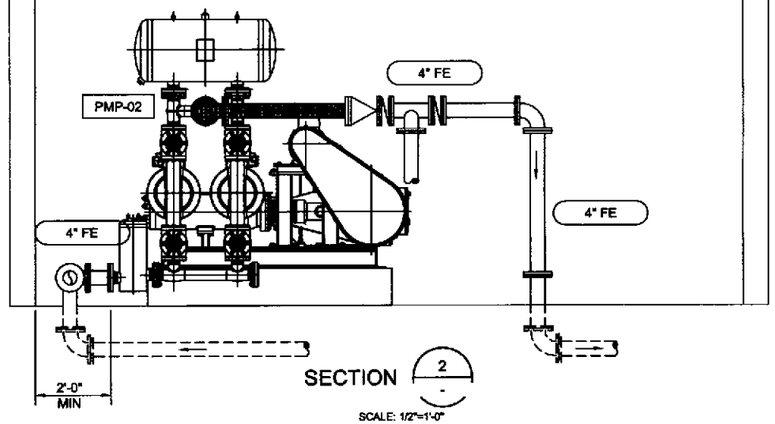
PLAN

SCALE: 1/2" = 1'-0"



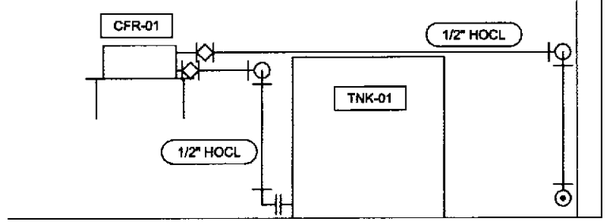
SECTION 1

SCALE: 1/2"=1'-0"



SECTION 2

SCALE: 1/2"=1'-0"



SECTION 3

SCALE: 1/2"=1'-0"

Key:

- Wastewater Flow Path
- Closed Valves
- Added Valve

Note: All other valves shown are Normally Open

CONFORMED DOCUMENT - THIS DOCUMENT WAS COMPILED FROM ALL BID PERIOD INFORMATION RELATIVE TO THIS SHEET. THE ENGINEER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION HEREIN. THE ORIGINAL BID DOCUMENTS ARE THE CONTRACTUAL DOCUMENTS FOR THIS PROJECT AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO UPDATE THOSE DOCUMENTS AS NECESSARY TO KEEP AN ACCURATE RECORD OF THE CONSTRUCTION. ORIGINAL DRAWINGS SIGNED BY THE DESIGN ENGINEER. CONFORMED DRAWINGS STAMPED AND SIGNED BY THE PROJECT MANAGER.

BROWN AND CALDWELL
BOISE, IDAHO

SUBMITTED: _____ DATE: _____ PROJECT MANAGER
APPROVED: _____ DATE: _____ BROWN AND CALDWELL

JUNE, 2008

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY)

DESIGNED: SPW
DRAWN: SDC
CHECKED: DPS
CHECKED: SPW
APPROVED: SPW/DPS

EXTERNAL REFERENCE FILES
08-224 base_PSR.dwg
133937-Mech-Base.dwg
133937-TBK-1000.dwg
HVAC-EPS_BLDG.dwg

PROFESSIONAL ENGINEER REGISTERED 11908 STATE OF IDAHO DEAN P. SMITH

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	0	CONFORMED DOCUMENT SET	SDC	2-13-09	DPS

IDAHO DEPARTMENT OF PARKS AND RECREATION

HEYBURN STATE PARK
CENTRAL SEWAGE COLLECTION AND TREATMENT SYSTEM
MECHANICAL
EFFLUENT PUMP STATION
PLANS AND DETAIL

FILENAME	133937-100-M-020
BC PROJECT NUMBER	133937
CLIENT PROJECT NUMBER	310570
DRAWING NUMBER	100-M-020
SHEET NUMBER	89 OF 110

SCOTT
Feb 12, 2009 - 2:27pm
L:\Drawn & saved\Projects\133937-2030\dwg_CAD\2-Sheets\M-Mechanical\133937-100-M-020.dwg
10PR.bmp

GENERAL NOTES

1. SEE SPECIFICATION SECTION 11416 FOR SPRAY IRRIGATION SYSTEM DETAILS.
2. SPRAY IRRIGATION SYSTEM SITE PIPING PLAN SHOWS CONCEPTUAL LAYOUT. FINAL DESIGN BY SPRAY IRRIGATION SYSTEM SUPPLIER.

KEY NOTES:

1. EXISTING FENCE.
2. EXISTING HORSE DROP OFF.
3. EXISTING TRAIL.
4. IRRIGATION CONTROL BUILDING.
5. 4" ISOLATION VALVE.
6. STORAGE POND NO. 2.
7. 4" PLUG VALVE TO DRAIN LINE.
8. 2" DRAIN VALVE. TYP ALL LINES.
9. 2" DRAIN.

0 100' 200'
SCALE IN FEET

STUB FOR FUTURE CONNECTION
N 2072387.15
E 2367433.85
N 2072387.15
E 2367167.28
N 2072387.15
E 2367691.25
N2072387.15
E 2368033.52
FULL CIRCLE SPRINKLERS
N 2072387.15
E 2368464.16
N 2072462.68
E 2368901.63
Ø100.00' TYP.
86.00' TYP
4"C2
ZONE 5
3.90 AC
ZONE 4
3.75 AC
ZONE 3
4.81 AC
ZONE 2
3.92 AC
ZONE 1
4.11 AC
FUTURE IRRIGATION EXPANSION
10 AC
N 2072091.86
E 2368899.44
N 2071984.47
E 2368889.65
SEE DWG 000-C-000
N 2072061.94
E 2368140.76
TBM #12
N 2071967.79
E 2368295.19
TBM #11
N 2071979.21
E 2368464.16
N 2071906.93
E 2368033.52
SEE DWG 000-C-000
N 2071750.72
E 2367166.21
N 2071850.72
E 2367434.13
N 2071750.72
E 2367690.39
N 2071750.72
E 2367926.13

BROWN AND CALDWELL BOISE, IDAHO	PROFESSIONAL ENGINEER LICENSED 13275 STATE OF IDAHO SHAWN P. WILSON 4/23/10	LINE IS 2 INCHES AT FULL SIZE (IF NOT 2" - SCALE ACCORDINGLY) DESIGNED: AMLL DRAWN: SDC CHECKED: DES CHECKED: SPW APPROVED: SPW

EXTERNAL REFERENCE FILES
133937-BASE OPT2.dwg
133937-TBM-1000.dwg
Yard Piping.dwg
Hanburn-82409-RP.dwg

RECORD DRAWING

THIS RECORD DRAWING WAS PREPARED USING INFORMATION REPORTED TO BROWN AND CALDWELL AND CONTAINS ONLY THE STANDARD AND CUSTOMARY LEVEL OF DETAIL. THE INFORMATION WAS NOT INDEPENDENTLY FIELD VERIFIED. THERE IS NO ONGOING PROGRAM TO UPDATE THE DRAWING TO REFLECT CHANGES SUBSEQUENT TO THE DATE INDICATED. THEREFORE, THIS DRAWING CANNOT BE RELIED UPON AS AN EXACT REPRESENTATION OF ACTUAL CONDITIONS.

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

IDAHO DEPARTMENT OF PARKS AND RECREATION

HEYBURN STATE PARK
CENTRAL SEWAGE COLLECTION AND TREATMENT SYSTEM
CIVIL
SPRAY IRRIGATION SYSTEM
SITE PIPING PLAN

FILENAME	133937-300-C-008
BC PROJECT NUMBER	133937
CLIENT PROJECT NUMBER	310870
DRAWING NUMBER	300-C-008
SHEET NUMBER	50 OF 110

JUNE, 2009

dpierson
Mar 30, 2010 - 7:57am
C:\cadd\temp\AcPublish_4240\133937-300-C-008_RR-19.dwg

IDPR Jump
Shawn Wilson.jpg

Appendix A: DEQ Re-Use Report

MEMORANDUM

TO: Larry Waters, PE, Wastewater Program Manager, State Office
Daniel Redline, Regional Administrator, Coeur d'Alene Regional Office
Matthew Plaisted, PE, Engineering Manager, Coeur d'Alene Regional Office
Adam Bussan, PE, Wastewater Program Reuse Engineer, State Office

FROM: John Tindall, Coeur d'Alene Regional Office
Judy Johnson, Wastewater Reuse Scientist, Technical Services Division

DATE: February 20, 2018

SUBJECT: **Heyburn State Park, M-221-02, Staff Analysis Supporting Reuse Permit Issuance**

Executive Summary

Heyburn State Park (HSP) owns and operates a raw sewage collection system, municipal wastewater treatment and reuse facility with recycled water irrigation on a native forest irrigation site. The facility received the first reuse permit May 2011 and began operating the seasonal irrigation system in 2011. HSP is classified as Class I systems for both wastewater collection and treatment. Wastewater is disinfected prior to irrigation to meet Class C standards and is applied on 20.49 acres of forested land. The influent flow design capacity is 10.8 million gallons (MG) annually. For reporting years 2011 through 2016, the facility applied an average of 3.39 MG to the irrigation sites. The 2016 influent flow was 2.45 MG. Recycled water is applied during the growing season of April 1 through October 31.

In 2016, the facility added 22 float homes to the collection system with a total estimated flow of 5,500 gallons per day (gpd), and flow into the system began in May 2017. Future plans for the facility include installing programmable timers to the application pumps and installing timers and dissolved oxygen monitors in the aeration lagoons.

Annual reports and inspections during this permit cycle have demonstrated substantial compliance with reuse permit limits and conditions. No changes to the irrigation site are proposed at this time.

The following are the major changes from the current permit proposed in the draft permit:

1. Increase the permit term from five (5) years to ten (10) year;
2. Add a phosphorus loading limit of 20 pounds of total phosphorus per acre per year (20 lb P/acre-year);
3. Reduce the number of soil management units from five (5) for each of the hydraulic management units to one (1) soil management unit covering all the irrigated acreage; and

4. Reduce the soil sampling frequency from twice per year in April and October to once per year in April prior to starting irrigation.

Staff recommends re-permitting this facility for a ten (10) year term. This staff analysis serves as the basis for the recommendation to issue reuse permit M-221-02.

1 Introduction

This memorandum satisfies the requirements of the "Recycled Water Rules" (IDAPA 58.01.17.400) for issuing reuse permits. The principal facts and significant questions considered in preparing the draft permit and a summary of the basis for the draft permit conditions are provided.

The facility submitted a permit application to the Idaho Department of Environmental Quality (DEQ) on August 6, 2008. DEQ accepted the application as complete on October 3, 2008 (DEQ 2011a, p. 3). On February 28, 2009, DEQ approved the plans and specifications for the construction of the new wastewater treatment and reuse facility. Construction was completed in 2010, and recycled water application began under Reuse Permit LA-0000221-01which was issued on May 6, 2011 and expired on May 9, 2016.

DEQ received an application for re-permitting the facility on November 10, 2015 (Williams 2015), and DEQ accepted the application as substantially complete on December 7, 2016. A preliminary decision to issue a draft permit was issued January 18, 2017.

2 Site Location and Ownership

HSP is a recreational area located 37 miles south of Coeur d'Alene and 7.5 miles east of Plummer in Benewah County. The wastewater treatment facility is on the west side of Chatcolet Lake in the southeastern portion of the park near the convergence of Plummer Creek and Pedee Creek. Road access is via State Highway 5, which travels through the park (Williams 2015, p. 2, 6; Wilson 2009, p. 14). The legal description for the treatment lagoons is Township 46N, Range 4W, Section 1, Boise Meridian (BLM 2017). The irrigation site is located adjacent to Storage Lagoon #2 (see Figure 3), roughly 0.7 miles southwest of the treatment lagoons (Morse 2008). The irrigation site is situated in Township 46N, Range 4W, Section 12 (BLM 2017). Both areas are located in the United States Geological Survey (USGS) Quadrangle of Chatcolet (DEQ 2011b, p. 5). Figures 1 and 2 show regional and facility maps for the wastewater treatment and irrigation sites. Also see Appendix A, Figures 1, 2, and 3 for maps of the area and facilities.

The Idaho Department of Parks and Recreation (IDPR) owns and manages the facility including the 5,744 acres of land that comprise HSP. On March 3, 2009, the Panhandle Health District entered into a Sewage Management Agreement (SMA) (Appendix B) with IDPR to address management of sewage within the HSP until a centralized wastewater treatment facility could be constructed. The SMA could be terminated now that the facility is completed. The responsible charge operator is Chris Hoosick who is also an IDPR employee. Backup operation for the facility is provided by Jason Wereley (E-3 Wastewater Consulting) as a contract operator (Hise 2017).

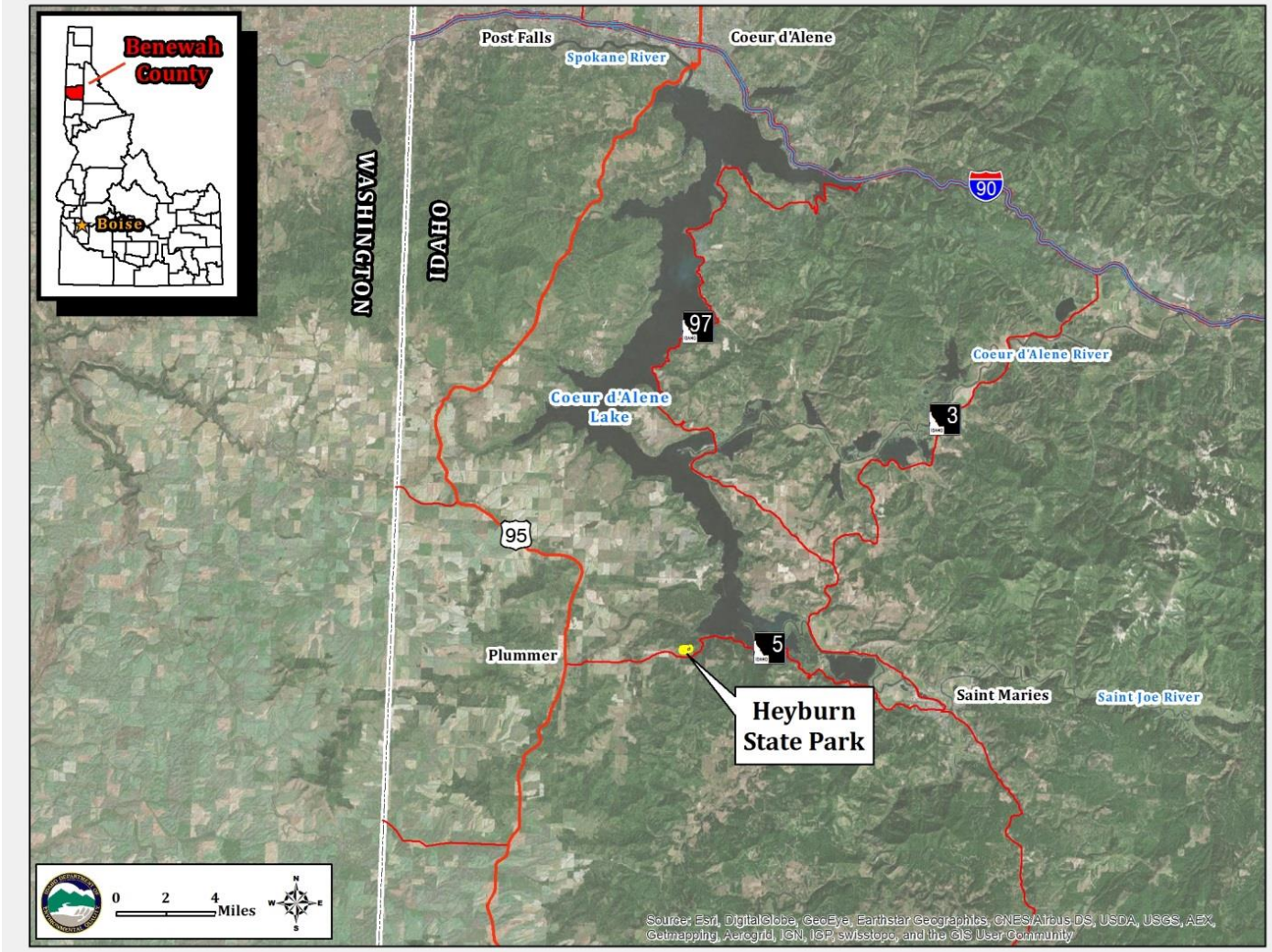


Figure 1. Heyburn State Park regional map.

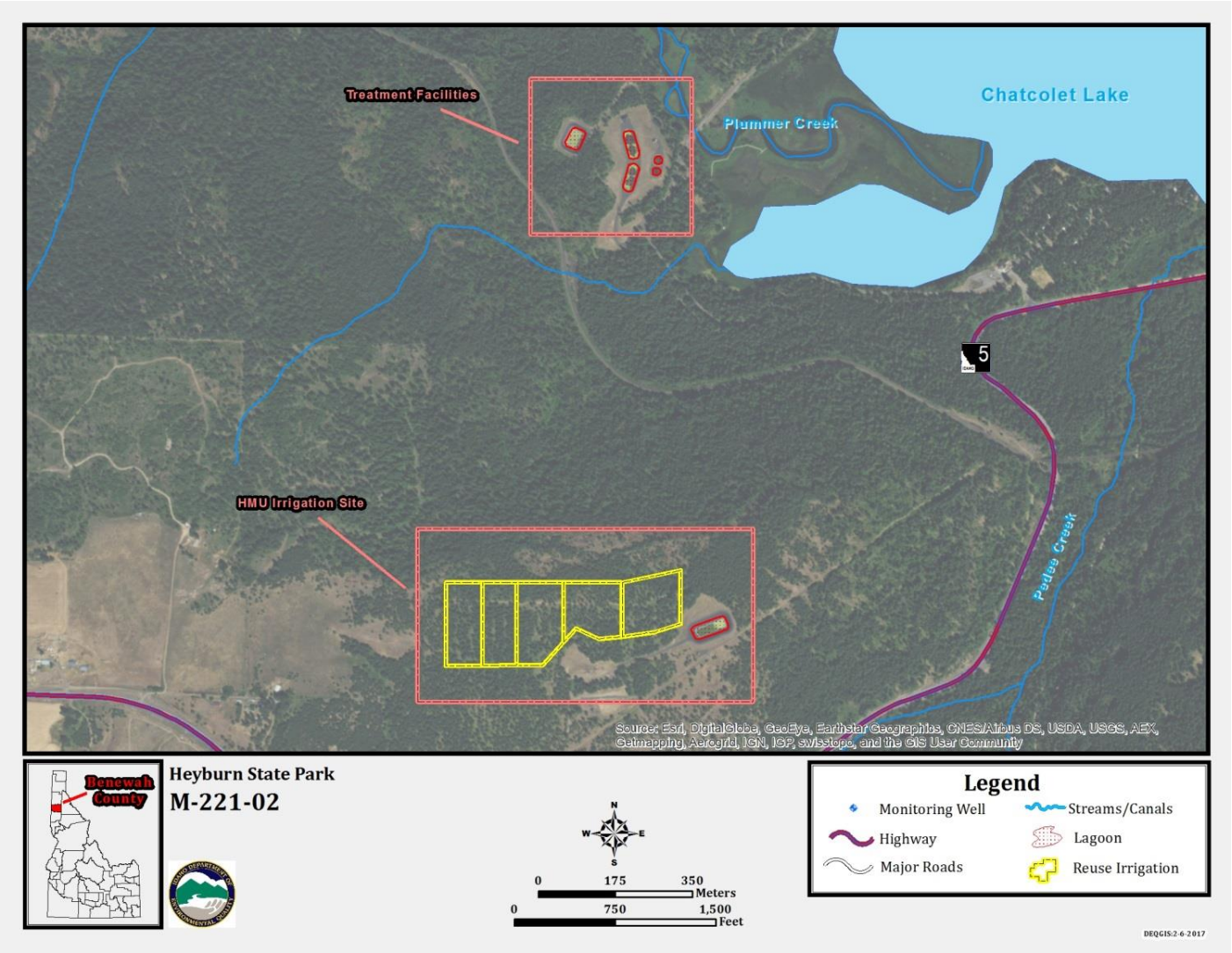


Figure 2. Heyburn State Park wastewater treatment facility and irrigation site.

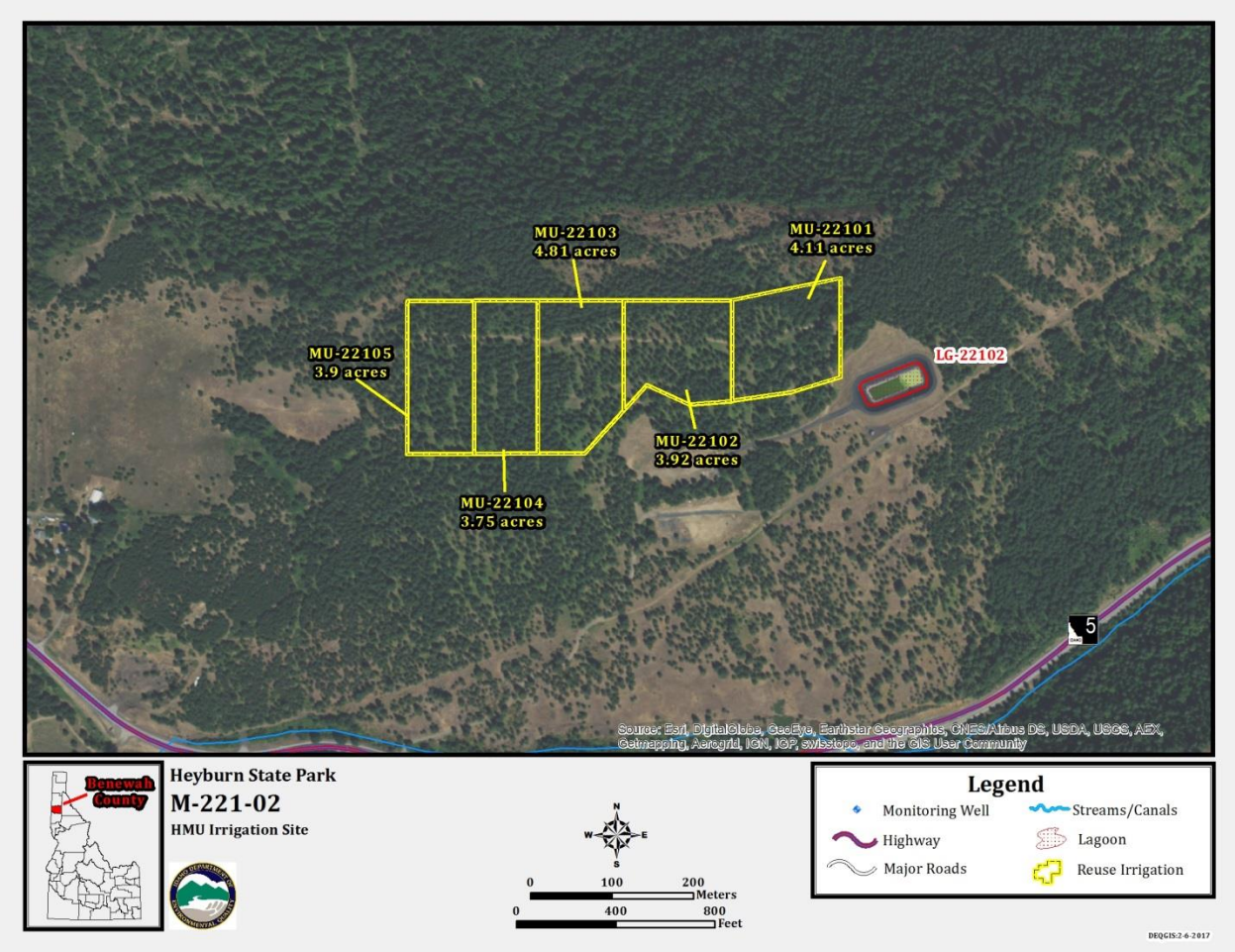


Figure 3. Heyburn State Park irrigation site.

3 Process

The HSP wastewater treatment system provides service to all facilities within the park (Table 1). There are currently 150 cabins, 22 float homes, 56 campsites, and other park-related facilities connected to the system, the majority of which are occupied seasonally.

The facility has a raw sewage gravity and pressure collection system to serve cabins, campgrounds, and float homes in the Chatcolet, Rocky Point, Hawley's Landing and Visitor's Center areas. A total of ten (10) duplex and simplex lift stations equipped with grinder pumps are utilized in the collection system. From the three (3) main lift stations (PS-2, PS-4 and PS-6) wastewater is pumped to the headworks of the treatment facility (Wilson 2012).

Table 1. Heyburn State Park treatment facility's wastewater sources.

Wastewater Sources	Quantity
Cabins	150
Float Homes	22
Campgrounds	56
Marina Store	1
Dock Pump-out Station	1
Maintenance Building	1
Employee Cabin	1
Visitors Center	1

The wastewater treatment and reuse facility consists of a headworks with a mechanical screen, two (2) aerated lagoons, two (2) sedimentation lagoons, two (2) storage lagoons, liquid sodium hypochlorite injection into the treated effluent being pumped to Storage Lagoon #2, and seasonal irrigation from Storage Lagoon #2 (Williams 2015, p. 8, 9). A total of 3.80 MG of recycled water was applied during the 2016 growing season onto 20.49 acres of forested land (6.8 inches/acre). A schematic for the wastewater treatment process is shown in Figure 4.

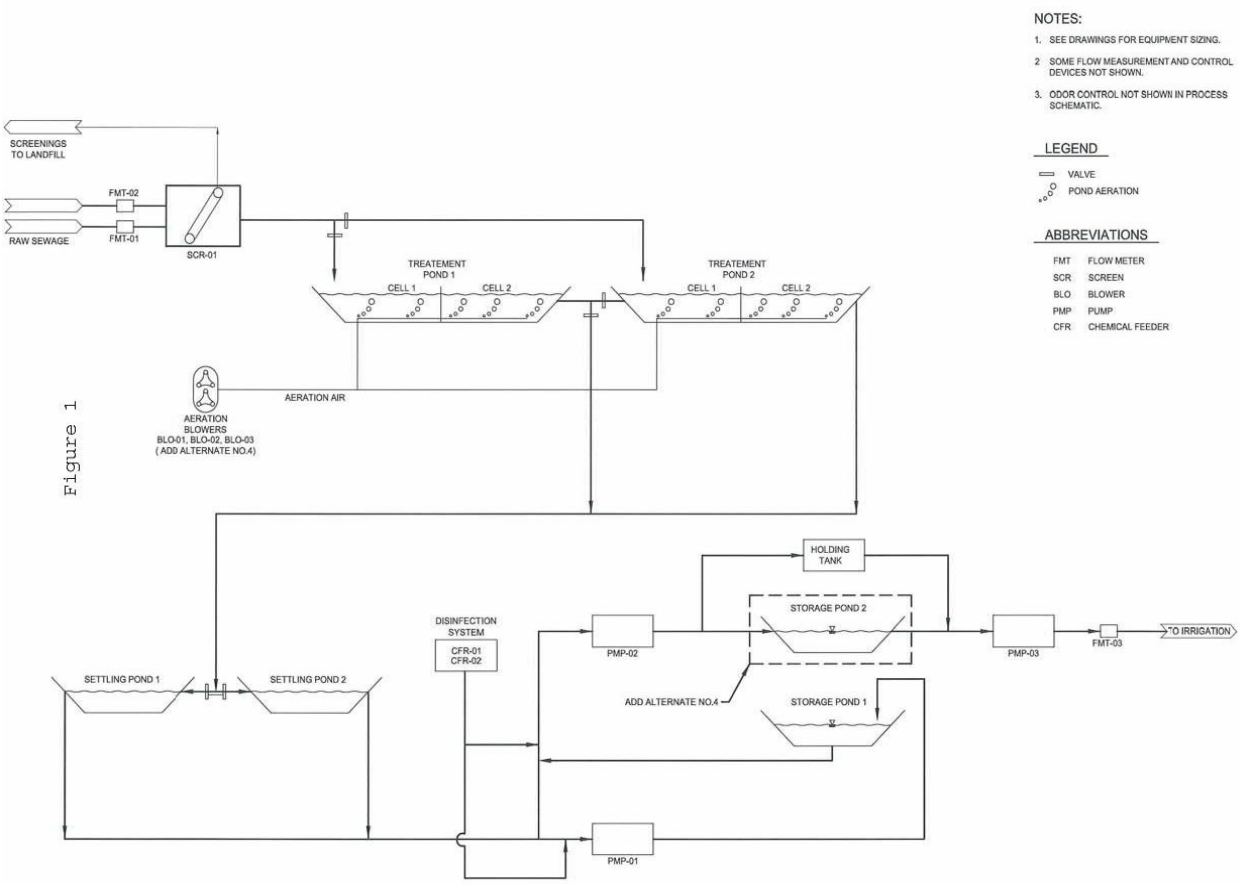


Figure 4. Heyburn State Park facility wastewater treatment flow.

Wastewater enters the treatment facility through two (2) main interceptor pipes, each with their own flowmeter, and continues through a mechanical screen. The screen collects debris and discharges it onto a conveyor belt that moves the debris through a washer and deposits it in a dumpster. Influent flow is then directed by gravity through inlet valves that control the direction of wastewater to either or both of the aerated lagoons (Wilson 2012, pp. 2-1, 3-1, 4-9i).

The aerated lagoons utilize three (3) positive displacement blowers with fine bubble diffusers to provide aeration for the biological treatment that occurs in the lagoons. Following treatment in the aerated lagoons, effluent exits by gravity flow through outlet valves to either of two (2) settling lagoons. The settling lagoons provide facultative treatment and settling of solids (Wilson 2012, p. 2-1, 4-1, 4-6i).

Supernatant from the settling lagoons is pumped to the effluent pump station that directs flow to either of two (2) storage lagoons. Storage Lagoon #1 (SL1) provides winter storage during periods of low flow (November through February) and Storage Lagoon #2 (SL2) is in use primarily during application periods. Anytime effluent is pumped to SL2, liquid sodium hypochlorite is injected into the discharge pipe to provide the contact time necessary to meet the disinfection permit requirements.

Typically beginning about April, effluent stored in SL1 is pumped to SL2 through a 4-inch, 12,600-foot long pipe. Liquid sodium hypochlorite, located in the effluent pump station, is injected into the discharge pipe between SL1 and SL2. The pipe provides a chlorine contact time of 165 minutes at 50 gallons per minute (gpm) (Wilson 2009, p. 10; Williams 2015, p. 9). The point of compliance for total coliform and total chlorine residual concentrations occurs at a sampling tap at the discharge point into SL2 (Wilson 2012, pp. 4-1, 5-1, 5-5i). Since there is no additional disinfection provided prior to irrigation after recycled water is pumped into SL2, anytime recycled water is pumped into SL2 total coliform and total chlorine residual sampling is required at the frequencies specified in the permit. The remaining permitted constituents (nitrogen and phosphorus) are sampled when recycled water from SL2 is being pumped to the irrigation site from a tap before the first irrigation sprinkler. All irrigation occurs from the recycled water stored in SL2 (DEQ 2011a, p. 3).

Table 2 provides a time table and the selections available for the settling lagoon effluent.

Table 2. Normal Operating Strategy for Filling SL1 and SL2 from the Settling Lagoons. (Wilson 2012, pp. 5-5i, 5-6i).

Months	Pump Number	Destination
December–February	Pump 1	SL1
May–October March–April	Pump 1, 2	SL1 to SL2
June–September November	Pump 2	SL2

The lagoon capacities are described in Table 3 and the location of the lagoons is shown in Appendix A (Figure 2).

Table 3. Heyburn State Park facility lagoons with identification number, description, and capacity.

Identification Number	Description	Capacity (million gallons)
LG-22101	Storage Lagoon #1	1.86
LG-22102	Storage Lagoon #2	2.50
LG-22103	Settling Lagoon #1	0.069
LG-22104	Settling Lagoon #2	0.069
LG-22105	Aeration Lagoon #1	0.57
LG-22106	Aeration Lagoon #2	0.57

Recycled water is applied via a pressurized spray irrigation system consisting of 6-foot risers and impact sprinkler heads. The system is capable of distributing the recycled water evenly throughout each MU at a flow rate of 125 gpm (Wilson 2012, p. 6-3i; Wilson 2009, p. 8; DEQ 2011a, p. 1).

The facility currently has five (5) forested management units (MUs) totaling 20.49 acres which are summarized in Table 4 and shown in Appendix A (Figure 3). Additional adjacent acreage is reserved for future expansion of the MUs (Wilson 2012, p. 6-1).

Table 4. Heyburn State Park facility MUs with identification number, description, and acreage.

Identification Number	Description	Acres
MU-22101	Zone #1	4.11
MU-22102	Zone #2	3.92
MU-22103	Zone #3	4.81
MU-22104	Zone #4	3.75
MU-22105	Zone #5	3.90
	Total Acreage	20.49

4 Site Characteristics

A well-managed treatment and reuse system limits recycled water application to rates that do not exceed the hydraulic and nutrient uptake rates of the vegetation and soils. This practice minimizes potential adverse impacts to public health, ground water quality, and surface water quality. Managing the timing and volume of recycled water applications are important factors for minimizing adverse impacts.

4.1 Site Management History

The vegetative cover of the MUs is native forest. The forest is comprised of a mixed conifer stand consisting of ponderosa pine, lodge pole pine, and Douglas-fir. The ponderosa pine dominates comprising over 80% of the tree density. Much of the site was planted with ponderosa pine in about 1967 on a 10 x 10-foot grid (Wheeler and Wheeler 2008, pp. A-1, A-4, A-5). The forest has not been harvested but thinning has been done to minimize fire hazards. There is a mix of understory vegetation including Ninebark, snowberry, ocean spray, Oregon grape, bitter cherry, bracken fern, wild rose, wild peony, mountain bell, pine reedgrass, elk sedge, cinquefoil lupine, spirea Idaho fescue, bromegrass, ryegrass, clustered elkweed, and many various annuals

(Wheeler and Wheeler 2008). The facility also interplants to decrease erosion, provide plant diversity, and make better use of soil resources (Benson 2017, p. 2).

4.2 Climatic Characteristics

The closest weather station to the facility is Plummer located about 8 miles west of the MUs (Morse 2008). The Plummer 3 WSW weather station (107188) has a longitude of 116° 57' West and latitude of 47° 19' North. The average annual precipitation is 28.89 inches per year of which 17.25 inches occur during the nongrowing season (November 1 through March 31). Average snowfall is 16.0 inches. The annual average maximum temperature is 57.0°F, and annual average minimum is 36.0°F. The altitude is 2,970 feet above mean sea level (amsl). Additional meteorological data are found at *http://wrcc.dri.edu/summary/climsmid.html* (WRCC 2013).

Evapotranspiration (ET) and precipitation deficit (P_{def}) data for the facility were taken from the Coeur d'Alene 1E station found at the ET_{Idaho} website: *http://data.kimberly.uidaho.edu/ETIdaho/stninfo.py?station=101956* (Allen and Robison 2012). The Coeur d'Alene station is located about 23 miles north of the application site (Morse 2008). Instead of the Plummer station, the Coeur d'Alene weather station was used for necessary parameters, which are explained in Section 4.6.2.

4.3 Soils

Soils on the MUs are Carlinton-Carlinton dry complex, and Carlinton ashy silt loam (Map Unit no. 330 and 335). The soil parent material consists of volcanic ash over loess (a loamy deposit dropped by wind). Both soils predominate on asymmetrical loess hills, hills, and plateaus with 3% to 20% and 8% to 25% slopes, respectively (NRCS 2017).

The water-holding capacity for this soil series is 5.7 inches and is from 21 to 40 inches in depth before reaching basalt bedrock (Warrick 2008, p. 7; NRCS 2017). This moderately well drained soil has a permeability of 0.57 to 1.98 inches per hour. Organic matter content in the surface zone is about 5%, pH is generally acidic, and there is a medium to low sensitivity to pH change (NRCS 2017). There is a high a risk of water and wind erosion, and a medium potential for leaching (DEQ 2007, section 2.1.2.2, Table 2-1, p. 2-9).

In April and October, the facility samples soil at three different depths from each irrigation zone. The permit renewal application requested a reduction in soil monitoring, which is discussed in Section 6.2.

Table 5 summarizes the facility soil data combining all three sampling depths (0–12, 12–24, and 24–36 inches) for operating years 2012 through 2016.

Table 5. Heyburn State Park facility soil analyses summary, 2011 through 2016.

Parameter	Mean	Median	Maximum	Minimum	Standard Deviation
Nitrate-N (mg/kg)	0.20	0.05	1.74	0.05	0.24
Ammonia-N (mg/kg)	0.79	0.46	10.3	0.05	1.24
Plant-Available Phosphorus (mg/kg)	15.0	11.2	76.6	1.00	14.0
Total Organic Matter (%)	3.48	3.36	7.62	0.82	1.60
pH (standard units)	6.20	6.21	7.98	4.97	0.49

Soil phosphorus levels greater than 51 mg/kg are considered very high for typical Idaho soil (DEQ 2007; section 2.2.1, p. 2-57). Soil plant-available phosphorus concentrations exceeded 51 mg/kg twice during the period being reviewed. In October 2013, phosphorus was reported as 76.6 mg/kg in the first 12 inches of soil, but quickly decreased in the 12-24, and 24-36 inch layers indicating uptake. In April 2016, MU-022101 showed phosphorus levels ranging from 58.7 to 65.2 mg/kg in the three (3) depths sampled, but in October these concentrations had dropped to 3 mg/kg or less. There are no trends indicating that soil plant-available phosphorus concentrations at the irrigation site are increasing over time.

4.4 Surface Water

The nearest surface waters are Pedee Creek, located about 0.25 miles east of the MUs; Chatcolet Lake, about 0.4 miles to the northeast; and Plummer Creek, about 0.6 miles to the north. Both Pedee and Plummer Creeks flow into Chatcolet Lake, which is the southern portion of Lake Coeur d'Alene. Plummer Creek is designated for cold water aquatic life, salmonid spawning, and secondary contact recreation. Chatcolet Lake and Pedee Creek support recreational use and the propagation of fish, shellfish, and wildlife (IDAPA 58.01.02.110.11; IDAPA 58.01.02.101.01).

There are no surface waters within the permitted buffer distance limit of 100 feet of the MUs. Chatcolet Lake is 2,207 feet above mean sea level (amsl), and the MUs are 2,440 feet amsl (USGS 2017). The HSP facility is located outside of any floodplains (FEMA 2009).

4.5 Ground Water/Hydrogeology

HSP is located in the northeastern portion of the Columbia River Plateau. During the Middle Miocene, the Columbia Plateau experienced high-volume volcanic eruptions, which left basalt formed sheets that are 30 to 300 feet thick. Embedded among these sheets are deposits of sand and gravel with smaller amounts of ash and clay (Rupert et al. 2014, p. 24; Wilson 2009, p. 13; Bishop 1969, p. 13).

Basaltic-rock aquifers that exist in the vicinity of the application site are generally discontinuous and isolated. Typical well depth is from 50 feet to greater than 200 feet, with yields of about 1.5 gpm for each foot of saturated basaltic rock penetrated. It appears ground water movement from higher areas travels through the individual basalt units until reaching major surface drainages (Whitehead 1994, p. H-21; Warrick 2008, p. 8; Wilson 2009, p. 15). The depth to ground water is less than 10 to 50 feet below ground surface (bgs) (Whitehead 1994, table 4, p. H-21).

No ground water was encountered in any of the test pits dug at the irrigation site May 7-8, 2008 which varied in depth from 3 feet to 6.5 feet. Ground water is likely to be found in the fractured basalt greater than 50 feet below the site (Warrick 2008). The current permit did not require any type of ground water monitoring. Based on the information obtained from the test pits and operation of the facility under the current permit, seasonal high ground water less than three (3) feet bgs does not appear likely to occur. Staff will not recommend that piezometers be installed in the irrigation site to monitor seasonal shallow ground water depths and provide information during the irrigation season (April to October) that is used to determine when seasonal ground water is sufficiently low to irrigate.

HSP has a public water system well (Well #3) located about 1.1 miles northeast of the MUs (Beckham 2009), which serves the Chatcolet area. Due to the distance between the MUs and the well, recycled water presents an unlikely source of potential contamination.

4.6 Recycled Water Characterization and Loading Rates

This section discusses recycled water characterization and hydraulic/constituent loading rates.

4.6.1 Recycled Water Characterization

Two (2) constituents of concern for recycled water application are nitrogen and phosphorus. The annual mean concentrations of nitrogen and phosphorus in the treated recycled water from 2011 to 2016 are shown in Table 6. The HSP facility treats wastewater mainly from a mix of seasonal cabins and campground bathrooms (see Table 1 in Section 3). The wastewater characteristics are unique to this facility when compared to typical untreated domestic wastewater from a community.

Total nitrogen concentrations in untreated domestic wastewater range from 20 to 85 milligrams per liter (mg/L) (DEQ 2007, section 3.4.4, p. 3-6). Total nitrogen includes nitrate-nitrogen, nitrite-nitrogen, ammonia-nitrogen, and organic nitrogen. Total Kjeldahl nitrogen (TKN) analysis measures ammonia-nitrogen and organic nitrogen in water. The total nitrogen concentrations measured in the HSP facility's treated recycled water are moderately high when compared to untreated domestic wastewater (see Table 6). Trends are difficult to determine due to inconsistency in the nitrogen sampling during the past permit cycle.

Phosphorus is present in wastewater as phosphate (orthophosphate, polyphosphate, and organically bound phosphate). Excess phosphorus in surface waters from wastewater can cause to algal growth called "blooms," which are a classic cause of eutrophication and can lead to decreased oxygen levels in surface water. Total phosphorus concentrations in domestic untreated wastewaters typically range from 2 to 20 mg/L (DEQ 2007, section 4.2.2.7.2, p. 4-33). The facility's average total phosphorus concentrations in the treated recycled water from 2011 through 2016 are high as compared to typical untreated domestic wastewater (see Table 6).

Table 6. Heyburn State Park facility recycled water total nitrogen and phosphorus concentrations by operating year.

Year	TKN	Nitrate+Nitrite-N	Total Nitrogen	Total Phosphorus
	milligrams per liter (mg/L)			
2011	12.90	20.67	33.57	10.97
2012	19.64[a]	19.86	39.50	20.14
2013	11.89[b]	Not Sampled	11.89[c]	15.57
2014	28.42	60.48	88.90	29.87
2015	21.36	Not Sampled	21.36[c]	4.61[d]
2016	31.33	57.03	88.36	29.01
Mean	20.92	39.51	62.58[e]	21.11[f]

a. Missing one sample
b. Missing three samples
c. Not representative (nitrate+nitrite-nitrogen not sampled)
d. Based on one sample
e. Excludes 2013 and 2015 data
f. Excludes 2015 data

Nitrogen and phosphorus loading rates are shown in Table 9 (see Section 4.5.4). The nitrogen and phosphorus concentrations in the recycled water have not caused the nitrogen and phosphorus loading rates to exceed the permitted nitrogen rate or estimated phosphorus uptake rates for a native conifer forest.

The facility disinfects the recycled water to Class C standards. The Idaho Recycled Water Rules (IDAPA 58.01.17.602.03) lists the required monitoring limits, which are discussed further in Section 6.1.1. Table 7 presents the total coliform concentration data results for the past six (6) years.

Table 7. Heyburn State Park facility total coliform data from 2011 through 2016.

Year	Total Coliform (CFU/100 mL)		
	Median	Range	Samples (#)
2011	ND[a]	ND - 34	14
2012	ND	ND - 80	14
2013	ND	ND - ND	25
2014	ND	ND - 9.2	29
2015	ND	ND - 33	28
2016	< 2	1 - < 2	25

Note: Colony forming units
a. Nondetect

4.6.2 Hydraulic Loading Rates

Recycled water application has occurred below the permitted hydraulic loading limits. Total annual wastewater influent and applied recycled water data are shown in Figure 5. Prior to bringing the storage lagoons online in 2011, about 4.36 MG of well water was pumped into the lagoons for seepage testing (Section 5.3; DEQ 2010, p. 1). For operating years 2011 through 2016, Figure 6 summarizes the total monthly recycled water hydraulic loading performance averaged across MUs 1, 2, 3, 4, and 5.

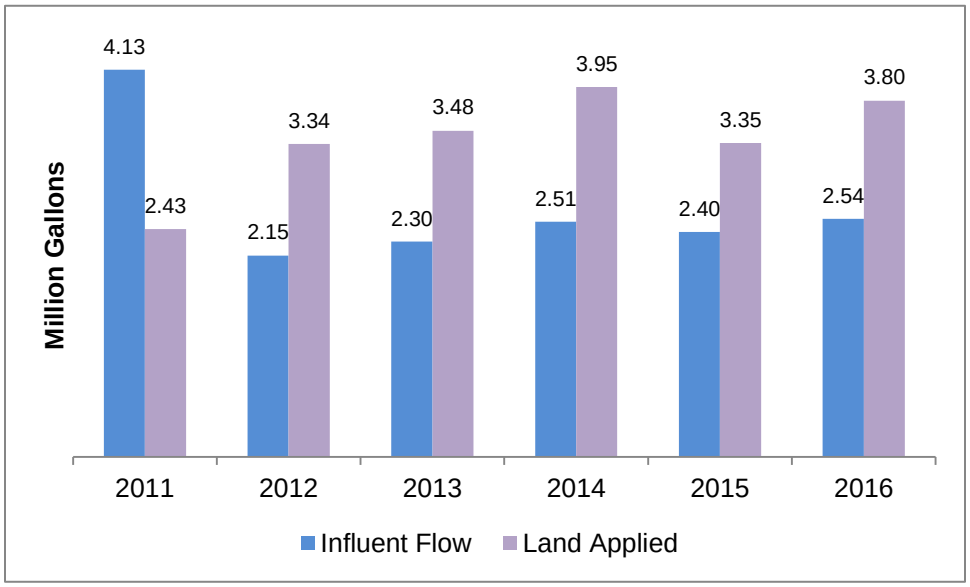


Figure 5. Heyburn State Park facility annual wastewater influent and recycled water effluent volumes during the course of the permit. The discrepancy between the influent and effluent flow in 2011 is due to the addition of well water to the storage lagoons for seepage testing in 2010.

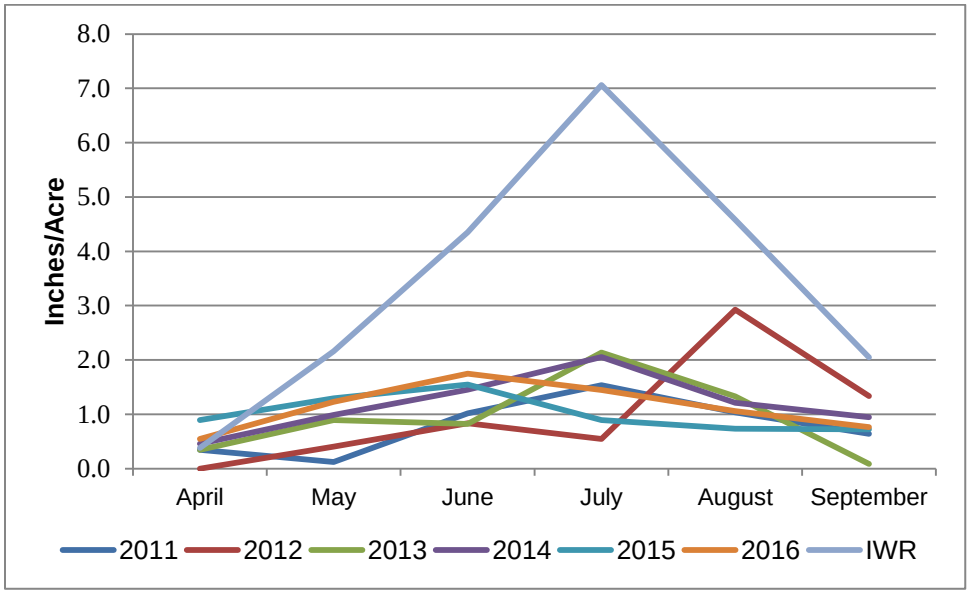


Figure 6. Heyburn State Park facility average monthly hydraulic loading by operating year.

The current permit specified that the hydraulic loading rate (HLR) for the forested site be no greater than the irrigation water requirement (IWR) during the growing season with monthly HLR limits and a total growing season maximum volume of 11.5 MG (20.58 inches per acre) listed in the permit (DEQ 2011b, section F, p. 7). Growing season hydraulic application rates are typically based on crop precipitation deficit values from the ET_{Idaho}2012 website (Allen and Robison 2012) and the efficiency of the irrigation system.

Native forest vegetation is not considered a crop, so a different approach must be used to calculate the IWR for the facility's MUs. Native forests have adapted to precipitation patterns that are location specific and have the capacity to vary the ET rate depending on precipitation amounts. Therefore, estimation of IWR on the native forest MUs is based on the following assumptions:

1. The precipitation deficit for a forested site is the same as "Orchards – Apples and Cherries no ground cover" and "Grass pasture – high management".
2. MUs have a mature conifer stand of primarily ponderosa pine, which is estimated to have a 75% tree canopy and 25% of the area with no trees and only understory coverage (see Photo 1 & Kolb 2017, p. 3).
3. A solid set irrigation system is assumed to have an irrigation efficiency (Ei) of 65% (DEQ 2007, section 4.4.8, p. 4-79).

The IWR is calculated for the facility's MUs using the following approach:

1. On the ET_{Idaho}2012 website (Allen and Robison 2012), select the most representative station to the application site—in this case the Coeur d'Alene station. The Plummer station is closer to the facility, but it is flagged as nonirrigated, so the P_{def} data are much lower than from an irrigated station. The Coeur d'Alene station is flagged as irrigated, which will yield P_{def} data conforming better to a recycled water application site.
2. Obtain monthly 80% exceedance P_{def} values for both "Orchards – Apples and Cherries no ground cover" and "Grass Pasture – High Management." A canopy density correction factor was not used for this location because that correction is only necessary when understory is not present; for these MUs, it is assumed that 25% of the vegetation covering the sites is understory (DEQ 2012, section 4.1.3.2.2, p. 5).
3. Calculate IWR in inches per month for each vegetation type using Equation 1.

Equation 1. Irrigation water requirement.

$$IWR\ (inches/month) = \frac{P_{def}}{E_i}$$

Where:

P_{def} = Precipitation deficit (80% exceedance)
E_i = Irrigation efficiency (65%)

4. Multiply the orchard IWR value by 0.75 and the grass pasture value by 0.25 to weight each requirement based on the vegetation coverage.
5. The P_{def} values for each vegetation type for the facility's MUs are added together to obtain the composted IWR. The growing season IWR values and the monthly hydraulic loading limits are shown in Table 8.

Table 8. Irrigation water requirement (IWR), calculated using P_{def} 80% exceedance values during the growing season.

Month	Orchard - No Ground Cover	Grass Pasture – High Management	Combined IWR
	inches per month		
April	0.33	0.16	0.49
May	1.94	1.00	2.94
June	4.52	1.36	5.88
July	7.17	2.37	9.54
August	5.32	1.65	6.98
September	2.81	0.91	3.72
October	0.10	0	0.10
Total	22.19	7.45	29.64

The draft permit eliminates specific HLR limits for each month and instead requires the HLR limit be substantially at or below the IWR. The MUs are native forest so the HLR limit can be below the IWR without negatively impacting the health of the forest because it is assumed that the native conifer forest would exist in a similar form without the recycled water irrigation. Setting the HLR limit to substantially at or below the IWR allows the permittee more flexibility in their year-to-year operations but also requires more attention by the operator to ensure that the sites are not hydraulically overloaded. Irrigation seasons can be drier or wetter than average which changes the IWR for a particular year. Using a monthly IWR based on 80% exceedance P_{def} values is a conservative approach for irrigating a forested site. Statistically based on the historical record, using the 80% exceedance P_{def} means that 20% of the time the actual IWRs will be less than the calculated IWR (an unusually wet irrigation season with less evapotranspiration) and 80% of the time the IWRs will be greater than these calculated IWRs.

The permittee will be required to justify the calculated HLR limit each year in their annual report. Setting the forested site HLR limit to substantially equal to or below the IWR, rather than setting specific monthly HLR limits is consistent with other permits recently issued by DEQ. The Plan of Operation will include the procedures for the operator to follow in setting the HLRs each year. The facility may use the monthly IWRs listed in Table 8 or provide an alternative methodology that DEQ approves in the updated Plan of Operation.

For permitting purposes, staff recommends that the annual HLR limit be equal to or below the IWR of the native conifer forest site and the growing season is from April 1 through October 31.

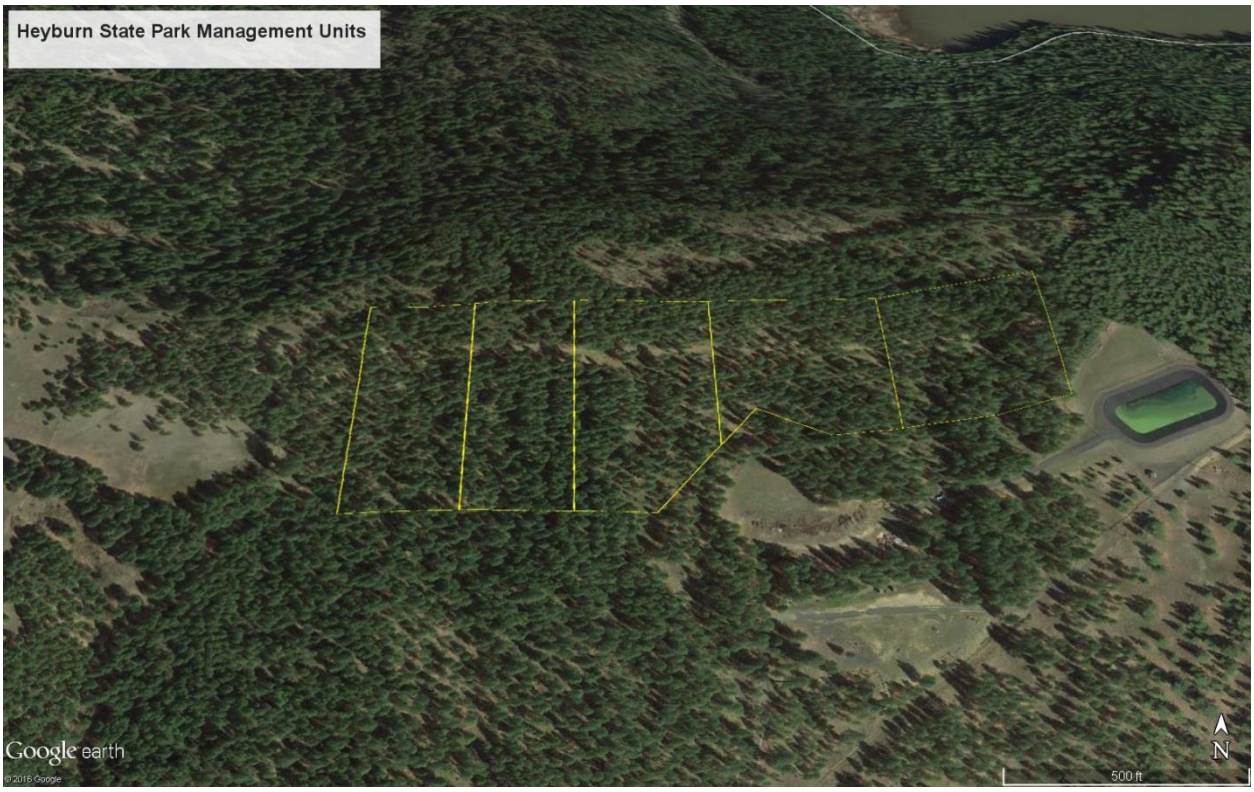


Photo 1. Tree canopy is estimated to cover 75% of the forested site within the five (5) management unit boundaries (yellow boundary lines). The Google Map image is from 2016.

4.6.3 Constituent Loading Rates

The current permit establishes loading limits for nitrogen at 66 pounds per acre-year (lb/acre-year). No loading limits were established for phosphorus (DEQ 2011b, section F, p. 7).

Typical nutrient uptake of nitrogen and phosphorus by mature non-grazed woodlands is estimated to be 100 lb N/acre-year, and 20 lb P/acre-year, respectively (NRCS 1998, Appendix I). Over the previous 6-year period, the annual average nitrogen loading rates were substantially below the current permit limit of 66 lb N/acre-year and loading rates for phosphorus have been consistently below the estimated crop uptake of 20 lb P/acre-year.

Total nitrogen and total phosphorus loading rates for 2011 through 2016 are shown in Table 9.

Table 9. Heyburn State Park facility average constituent loading rates per operating year.

Year	Nitrogen Loading	Phosphorus Loading
	pounds per acre-year (lb/acre-year)	
2011	6.71	2.20
2012	12.15	6.05
2013	7.55[a]	3.25
2014	17.30	5.38
2015	5.00[a]	0.93[b]
2016	19.34	6.98
Mean	13.88[c]	4.77[d]

a. Nitrate+nitrite-nitrogen were not sampled in 2013 and 2015
b. Based on one sample
c. Data for 2013 and 2015 is not included in mean
d. Data for 2015 is not included in mean

4.6.3.1 Nitrogen Loading Rates

Nitrogen loading rate limits for forested sites can be determined using Equation 2 from DEQ's *Guidance for Forested/Poplar Site Nutrient and Hydraulic Loading* (DEQ 2012, section 4.2.2.4.3, p. 17):

Equation 2. Nitrogen loading.

$$N_{rate} = \frac{N_{uptake} - N_{cr}}{1 - N_{loss}} = \frac{N_{req}}{e_f}$$

where:
N_{rate} = N loading rate (lb N/acre-year)
N_{uptake} = N net uptake (lb N/acre-year)
N_{cr} = N credits (lb N/acre-year) = 0 lb N/acre-year[1]
N_{loss} = N losses from denitrification and volatilization (lb N/acre-year)
e_f = Uptake efficiency factor (1-N_{loss})
N_{req} = N_{uptake} - N_{cr} = N net requirement (lb N/acre-year)

1. Assume no appreciable change in soil storage from initial time of recycled water application to the end of permit cycle. To-date soil nitrogen has shown little change during the current permit cycle (see Section 6.2).

The dominant tree species in the forested site is ponderosa pine (Section 4.1) with a likely age of over 40 years (Wheeler and Wheeler 2008, p. A-1). The data provided in Tables 13 and 14 of the guidance (DEQ 2012, section 4.2.2.4.3, pp.19-20) estimates a nitrogen uptake rate for 40-year old pine forest with a 100% canopy cover at 30 lb N/acre-year. The nitrogen uptake rate from 100% coverage by a herbaceous vegetated understory is estimated at 75 lb N/acre-year and 100% woody vegetated understory is estimated at 40 lb N/acre-year.

The current permit estimated pine tree forest canopy coverage of 50% and 50% coverage by herbaceous understory. The estimated nitrogen uptake rate from this mix of vegetation was 66 lb/acre-year (DEQ 2011a).

For the proposed 10-year permit cycle and based on estimations from the aerial view of the forested site (see Photo 1), the estimated coverage by the pine trees will be 75% and the estimated nitrogen uptake rate for the forested portion of the MUs is estimated to be 75% of 30 lb N/acre-year, or 22.5 lb N/acre-year.

Understory vegetation covers most of the forest floor even in the north area where the tree density is the highest (Wheeler and Wheeler 2008). Assuming there are 75% herbaceous vegetation and 25% woody vegetation, the composite estimated understory nitrogen uptake rate is 75% of 75 lb N/acre-year or 56 lb N/acre-year plus 25% of 40 lb N/acre-year or 10 lb N/acre-year for a total of 66 lb N/acre-year for the understory.

The DEQ Guidance also recommends a 15% - 25% denitrification loss rate for the irrigation of recycled water on forested sites (DEQ 2012). Estimating a 25% denitrification loss rate, the uptake efficiency (e_f) from Equation 2 above is 0.75. Based on these estimates and assumptions, an estimated nitrogen uptake using Equation 2 is the following:

$$Nrate = \frac{Nuptake - Ncr}{N - Nloss} = \frac{(23+66)-0}{1-0.25} = \frac{89}{0.75} = 119 \text{ lb nitrogen/acre-year}$$

Another alternative for estimating the nitrogen uptake rates, although not region-specific and more generalized compared to the method presented above, is using the NRCS guidance *Nutrient Uptake and Removal–Nutrients Available from Livestock Manure Relative to Crop Growth Requirements* (Appendix I, Part C) (NRCS 1998). This reference provides general recommendations for both nitrogen and phosphorus application rates for non-grazed, privately owned woodlands as follows: 100 lb N/acre-year and 20 lb P/acre-year. This same reference also recommends applying a 70% *nitrogen recovery factor* (i.e., e_f, the uptake efficiency factor) to the recommended values. The NRCS recommends the following loading:

100 lb/ac ÷ 0.7 = 143 lb N/acre-year.

Ground water monitoring of the irrigation site will not be recommended in the draft permit (see Section 6.3). The current permit nitrogen loading rate limit is 66 lb N/acre-year but the average loading rate has been 14 lb N/acre-year with a maximum of 19 lb N/acre-year in 2016 (see Table 9). As discussed in Section 6.2, nitrogen does not appear to be accumulating in the soil from the past nitrogen loading rates. This appears to indicate that at the nitrogen loading rates applied during these years, there was adequate uptake of the applied nitrogen based on a comparison of the October (end of the irrigation season) and April (beginning of the irrigation season) soil sample concentrations. If the nitrogen loading rates start to increase from population increases and/or higher nitrogen concentrations in the irrigated recycled water, there is not going to be a way to directly monitor the ground water quality to determine if the uptake rates by the trees and understory continue to be adequate to prevent excessive nitrogen migrating past the root zone into the ground water. Ground water modeling has not been done to predict impacts to ground water if nitrogen is assumed to be moving past the root zone. Continued soil sampling for nitrogen would help to determine if there are any trends of increasing soil nitrogen concentrations compared to historical concentrations but this is not as reliable an indicator as ground water monitoring would be.

It is important to set reasonable nitrogen loading limits for the specific mixture of trees and understory in an attempt to prevent impacting ground water quality and public health. In this case, without ground water monitoring, continued monitoring of soil nitrogen concentrations can provide information on whether the annual nitrogen loading rates and permitted maximum loading rates are in excess of the nitrogen uptake rates of the vegetation.

The current permitted nitrogen rate loading limit is 66 lb N/acre-year. The estimated nitrogen uptake rates calculated from the two (2) approaches presented above are relatively close. It is recommended that the draft permit include an increased nitrogen rate loading limit of 119 lb N/acre-year. It will also be recommended that monitoring of soil nitrogen is continued. The higher nitrogen loading rate permit limit is justified based on a more detailed evaluation of the type and coverage of the vegetation growing on the forested site.

4.6.3.2 Phosphorus Loading Rates

For forested reuse systems near surface water bodies, it is particularly important to have confidence that phosphorus loading rates are less than the native conifer forest estimated uptake rates and the phosphorus retention capacity of the soil to prevent phosphorus from migrating into surface waters. As previously stated, ground water monitoring has not been used in the past to evaluate whether phosphorus in the recycled water is being applied at rates exceeding the plant uptake and soil retention capacities. Instead, annual phosphorus loading rates are compared to referenced estimated plant uptake rates and soil phosphorus concentrations are annually monitored for signs of increasing trends. Surface runoff from the irrigation site is also prohibited during the irrigation season (April to October).

Based on the data collected from 2011 to 2016 (excluding 2015; sections 4.6.1 and 4.6.3), the average total phosphorus concentration in the recycled water was 21.11 mg/L, and the average annual total phosphorus loading rate was 4.77 lb P/acre-year (see Table 9, Section 4.6.3). During this period, phosphorus loading rates have been lower than the estimated forest plants' uptake rate of 20 lb P/acre-year (NRCS 1998).

From 2011 to 2016, plant-available phosphorus (orthophosphate) concentrations in the soil samples collected (see Table 5, Section 4.2) showed that phosphorus concentrations were generally at or below the medium range (15–30 mg/kg) for phosphorus concentrations in typical Idaho soils (DEQ 2007, Section 2.5.1, p. 2-57). As shown in Section 6.2, there does not appear to be any increasing trends of plant-available phosphorus in the soils from the past loading rates.

The past phosphorus loading rates at the irrigation site have not exceeded the estimated annual forest plants' uptake rate of phosphorus. There were also no trends observed of increasing plant-available phosphorus in the soil which is an indication that phosphorus is not being applied in excess of what the plants are able to uptake. The nearest surface water is Pedee Creek, located about 1,320 feet east of the irrigation site (see Figure 2, Section 2). It is unlikely that the phosphorus from the irrigation of recycled water on this site and at the current application rates would impact the nearby surface water. Due to the proximity of the irrigation site to Chatcolet Lake (see Figure 2, Section 2), it will always be important to have the ability to assess the potential impact from the irrigation of nutrients on the site on nearby surface waters.

Staff recommends that the draft permit include monthly monitoring of the phosphorus loading rates from the irrigated recycled water (as currently is being required), a phosphorus loading limit of 20 lb P/acre-year and soil sampling for plant-available phosphorus. Section 6.2 addresses soil monitoring requirements in greater detail. The annual recycled water and soil data will be used to determine if there could be any detrimental impacts from the irrigation of recycled water to the nearby surface waters. The phosphorus loading limit will assure that loading rates do not exceed the estimated vegetation uptake rates of a native conifer forest.

5 Site Management

Site management discusses buffer zones, runoff, seepage testing, waste solids management and disposal, cropping plan, grazing, salts, and silvicultural planning.

5.1 Buffer Zones

Separation distances and the impact mitigation strategies employed in buffer zones vary depending on the effects that are to be controlled. Buffer zone management must also consider the nature of the receiving environment and its sensitivity to these impacts. Levels of effluent disinfection are of concern as this directly relates to the potential for the pathogens in the effluent to infect humans or animals.

The irrigation site is located in a rural area with solid set sprinklers used for recycled water application. The public may come near the irrigation site during hikes or horseback riding in the area. Currently the no fencing is required around the irrigation site because a fence may obstruct the movement of wildlife through the area (DEQ 2011a, section 4.3, p. 10). Instead, signage is placed at public access points, corners, and at least every 100 feet along the irrigation site perimeter. It is important that the signage be maintained to prevent the public from inadvertently walking or riding through the irrigation site during the irrigation season. The operator must also be aware of wind conditions that could cause aerosol drift from the irrigation and impact the public outside the perimeter of the irrigation site. There have been no reports to DEQ of any exposure to the public from the irrigation of recycled water at this site. The facility has the capability to consistently disinfect the recycled to meet Class C disinfection requirements based on past total coliform concentrations (see Table 7, Section 4.6.1).

Recommended buffer zone distances from the irrigation site used in conjunction with Class C disinfection requirements are specified in Section 4.4 of the draft permit. Table 10 summarizes the required buffer distances for Class C disinfection in a rural setting and utilizing sprinkler irrigation. The current irrigation site meets the required buffer distances.

Table 10. Heyburn State Park facility required buffer distances (Class C recycled water).

Buffered Object	Minimum Buffer Distance (feet)
Inhabited Dwelling	300
Private Water Supply	500
Public Water Supply	1,000
Permanent and Intermittent Surface Water	100
Irrigation Ditches and Canals	50
Areas Accessible to the Public	0
Drinking Water Reservoir	500

Staff recommends that the draft permit include Class C disinfection requirements along with the associated recommended buffer zones and signage every 100 feet and at the corners around the perimeter of the irrigation site. See Section 6.1.1 for the recommended total coliform and total chlorine residual concentrations monitoring frequencies. Staff will not recommend that fencing will be required.

5.2 Runoff

There have been no reported incidents or complaints of recycled water runoff from this facility. The facility submitted a runoff management plan to DEQ on November 5, 2012. A compliance activity is included in the draft permit that requires the facility to submit an updated runoff management plan addressing the best management practices for minimizing runoff and ponding on the irrigation site.

5.3 Seepage Rate Testing

Seepage testing of sedimentation lagoons, storage lagoons, and aeration lagoons was completed before the lagoons were put into service. DEQ accepted the lagoon seepage test results on January 5, 2011. A summary of the results are listed in Table 11. The draft permit is proposed for a ten (10) year term and seepage testing will be due during the permit cycle. The draft permit contains a compliance activity to complete seepage testing of the lagoons. All lagoon modifications, repair or other situations that could change the permeability of the liner will require seepage testing before returning the lagoon to service.

Table 11. Summary of facility lagoon seepage testing and results.

Lagoon	Test Completion	Seepage Rate (in./day)	Allowable Rate (in./day)	Next Seepage Due Date
Aeration Lagoon 1	August 11, 2010	0.0584	0.125	August 31, 2020
Aeration Lagoon 2	August 18, 2010	0.0438	0.125	August 31, 2020
Settling Lagoon 1	August 11, 2010	0.0360	0.125	August 31, 2020
Settling Lagoon 2	August 11, 2010	0.0772	0.125	August 31, 2020
Storage Lagoon 1	September 18, 2010	0.0165	0.125	September 30, 2020
Storage Lagoon 2	October 27, 2010	0.0926	0.125	October 31, 2020

Source: Hipwell 2010, p. 1

Procedures for completing seepage tests should be submitted at least 45 days before the planned seepage testing. Information on seepage testing procedures is located at *http://www.deq.idaho.gov/water-quality/wastewater/lagoon-seepage-testing.aspx*.

Seepage test requirements are found in the "Wastewater Rules" (IDAPA 58.01.16.493): *http://adminrules.idaho.gov/rules/current/58/0116.pdf*.

5.4 Waste Biosolids, Sludge, and Solid Waste

Land application of waste solids is currently not allowed at this irrigation site. The facility is not expected to have substantial waste solids build-up in the lagoons during this permit cycle because the lagoons have only been in operation since 2010. It would be unusual for solids to accumulate to that level in only seven (7) years. However, if sludge in the lagoons builds up to the point that solids removal is required, the facility must submit a solids management plan to DEQ for review and approval prior to any removal or land application of the solids.

5.5 Nuisance Odors

Nuisance odors from any of the HSP facility's (collection system, lagoons or irrigation site) has not been reported to DEQ or documented in the annual reports. The facility has not received an odor complaint from neighbors since it began operation in 2010 and it is not expected that odors will be an issue going forward. An odor management plan was submitted to DEQ in the Plan of Operation (Wilson 2012, Section 5-3, p. 22) and an update to the odor plan is recommended as a compliance activity in the draft permit.

5.6 Cropping Plan

A cropping plan is not required for a forested site. The facility will not be required to calculate nitrogen and phosphorus removal during thinning, because this calculation would be complex, requiring numerous assumptions with uncertainty in connection with the calculated estimated values. The silvicultural plan (see Section 5.9) will include recommendations for thinning, tree species densities and tree spacing within the irrigation site.

5.7 Grazing

Grazing is not proposed at this site, and a grazing management plan will not be required in the draft permit. No grazing will be allowed on the irrigation site.

5.8 Salts

Salt loading is not anticipated to be high enough to cause impacts to soil or ground water. Submittal of a salt loading management plan is not included in the draft permit.

5.9 Silvicultural Plan

A silvicultural plan was prepared by Idaho Panhandle Forestry Consultants (Wheeler and Wheeler 2008) for the irrigations site. The silvicultural plan describes the site, types of vegetation and health of the vegetation. Recommendations for short-term and long-term operations were included. The plan estimated that the 20-acre site could absorb about 86,400 gallons of recycled water over a 12-hour period with a 70% transpiration rate. ET rates can be maximized by encouraging growth of a variety of tree ages, sizes and species (Wheeler and Wheeler 2008, pp. A-9, A-13).

An updated silvicultural plan prepared by a professional silviculturist (forester) is recommended as a compliance activity (CA-221-04) in the draft permit. The updated plan should provide recommendations for how the HSP staff should manage the forested irrigation sites to optimize the ET and nutrient uptake. Recommendations for the timing and criteria to be used for thinning and planting in the irrigation site should also be included. The HSP facility will be required to follow the recommendations listed in the silvicultural plan and provide yearly updates in the annual reports.

6 Monitoring

Monitoring requirements are provided in the draft permit to determine compliance with permit limits and provide long-term site performance benchmarking. A majority of the proposed monitoring is unchanged from the previous permit as the current monitoring appears consistent with current DEQ monitoring objectives and methods.

The proposed monitoring requirements for the draft permit are described in the following subsections. All monitoring will be conducted according to a facility quality assurance project plan (QAPP).

6.1 Recycled Water Monitoring

The current permit requires the facility to monitor treated effluent weekly for total coliform and monthly for nitrate+nitrite-nitrogen, TKN, and total phosphorus during the irrigation season. During months when irrigation does not take place, total coliform monitoring is required monthly to assure recycled water entering Storage Lagoon 2 (SL2) meets Class C disinfection standards. The sampling location for total coliforms and total chlorine residual is from a sample tap designated WW-221-01 in the current permit and located at the discharge point into SL2. The sampling location for all other referenced constituents is just before the first irrigation sprinkler at sample tap WW-221-02. These monitoring requirements are consistent with other Class C reuse systems in the area.

6.1.1 Disinfection

To meet Class C disinfection requirements the median number of total coliform organisms in the recycled water cannot exceed 23 per 100 milliliters and does not exceed 230 per 100 milliliters in any confirmed sample as determined from the bacteriological results of the last five (5) days for which analyses have been completed. For Class C effluent, analysis shall be based on weekly

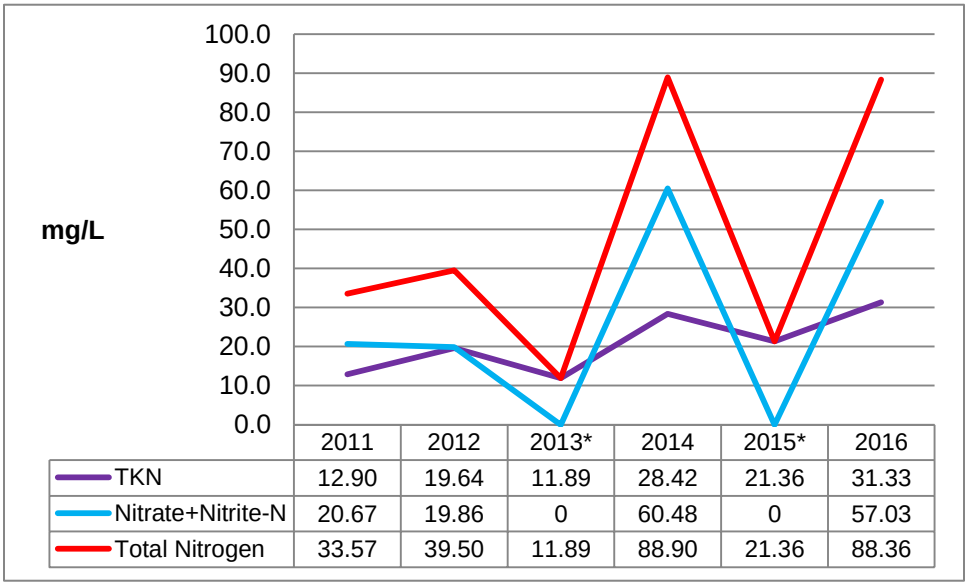
sampling during periods of application. The point of compliance for Class C effluent for total coliform shall be at any point in the system following final treatment and disinfection contact time (IDAPA 58.01.17.601.03, p. 15).

The facility design included disinfection of the recycled water as the water was pumped from SL1 to SL2 (see Figure 4, Section 3). The facility cannot disinfect as water is pumped from SL2 to the irrigation site. During the non-irrigation months, the current permit requires monthly monitoring of the total coliform concentrations and daily total chlorine residual concentrations from sample tap WW-221-01. During the irrigation months, weekly sampling of those constituents from the sample tap are required. This is consistent with the requirement for meeting the disinfection requirements at any point following final treatment and contact time.

Staff recommends that the same disinfection requirements as in the current permit (Class C total coliform limits, point of compliance and monitoring frequencies for total coliform and total chlorine residual) be included in the draft permit.

6.1.2 Nitrogen

Based on the facility's 2011 to 2016 annual reports, nitrogen monitoring results demonstrated that the facility was consistently below the nitrogen loading rate limit of 66 lb N/acre-year (see Table 9, Section 4.6.3). As limited historical data is available for TKN and nitrate+nitrite-nitrogen concentrations in the recycled water and nitrogen concentrations are trending upwards (see Figure 7), staff recommends that the draft permit continue to require monthly monitoring of these constituents. This information will be needed with monthly irrigated flow volumes when irrigating to calculate the annual nitrogen loading rates and demonstrate compliance with the proposed nitrogen loading rate limit.



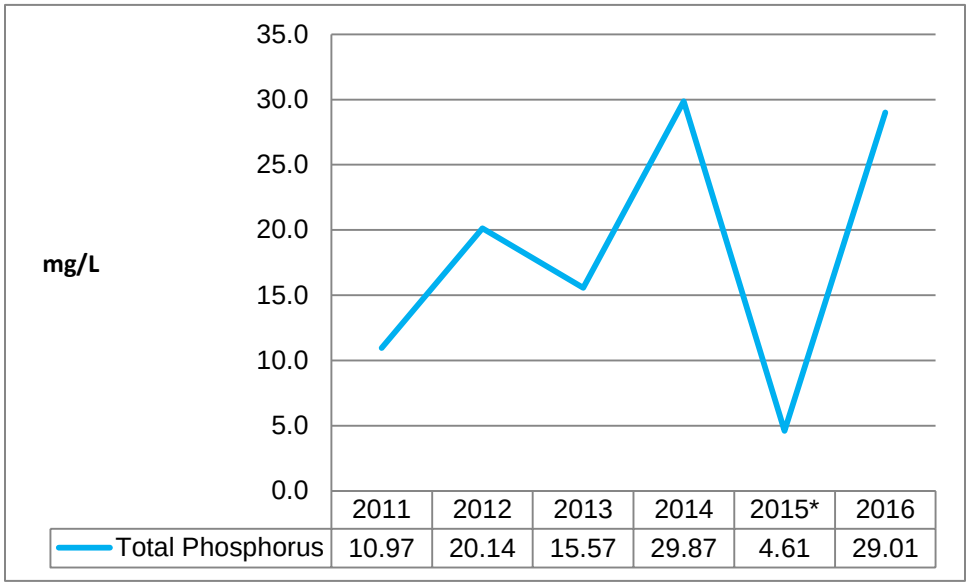
	2011	2012	2013*	2014	2015*	2016
TKN	12.90	19.64	11.89	28.42	21.36	31.33
Nitrate+Nitrite-N	20.67	19.86	0	60.48	0	57.03
Total Nitrogen	33.57	39.50	11.89	88.90	21.36	88.36

* In 2013 and 2015 no nitrate+nitrite-nitrogen was collected.

Figure 7. Heyburn State Park facility recycled water TKN and nitrate+nitrite-nitrogen concentrations by operating year.

6.1.3 Phosphorus

Phosphorus limits are generally required when there are concerns about surface water interactions or a ground water/surface water interconnection with the irrigation site. There are no ground water standards for phosphorus because unlike nitrogen, phosphorus does not pose a direct threat to human health. The facility's potential phosphorus impacts to the nearby surface waters are considered to be low. It is likely the facility would become hydraulically limited before becoming nutrient (phosphorus) limited. Figure 7 shows the historical total phosphorus concentrations in the recycled water being irrigated.



* The average reflected in 2015 is for a single total phosphorus sample.

Figure 8. Heyburn State Park facility recycled water total phosphorus concentrations by operating year.

The recycled water phosphorus loadings from 2011 through 2016 have been consistently below 10 lb P/acre-year (see Table 9, Section 4.6.3), which is less than the estimated forest plants' uptake rate of 20 lb P/acre (NRCS 1998). Annual soil sampling over the past six (6) years of operation has not indicated that phosphorus is building up in the soil (see Section 4.5.4.2). Due to the proximity of the irrigation site to Chatcolet Lake (see Figure 2, Section 2), it will continue to be important to monitor the phosphorus application rates from the recycled water and soil phosphorus concentrations. Staff recommends that the draft permit continue requiring monthly monitoring of total phosphorus in the recycled water when irrigating and reporting of the annual total phosphorus loading rates in the annual reports. Staff also recommends that an annual total phosphorus loading rate limit of 20 lb P/acre-year be included in the draft permit due to the proximity of the irrigation site to Chatcolet Lake.

6.2 Soil Monitoring

Soil monitoring is required primarily for nutrient management purposes. Soil sampling is also required to assess soil quality. Long-term soil characterization can reflect effects of land use and soil data can then be used to determine appropriate loading rates and management. The facility is currently required to sample soil from each MU in April and October. Soil samples are collected

at 0–12, 12–24, and 24–36 inches below ground surface. The analyses include percent organic matter, percent total solids, pH, nitrate-nitrogen, ammonia-nitrogen and plant-available phosphorus (orthophosphate).

The percent organic matter in soil is the portion made of plant and animal residues at different stages of decomposition. At levels of 4% to 6%, nutrient availability and water-holding capacity in the soil increases. The Carlinton soil series has organic matter content in the surface zone at about 5% (Section 4.3). As soil percent organic matter has remained relatively stable between 2012 through 2016, staff will not recommend that the draft permit include monitoring of this parameter. Table 12 shows a summary of the measured average percent organic matter from the MUs.

Table 12. Heyburn State Park facility soil percent organic matter.

Year	April			October		
	0–12	12–24	24–36	0–12	12–24	24–36
	inches			inches		
2012	3.18	1.99	1.13	Not Sampled		
2013	4.53	2.60	3.64	2.98	1.46	1.12
2014	3.62	2.57	3.22	5.42	3.84	3.56
2015	4.74	2.96	3.01	6.42	2.96	5.88
2016	5.76	4.42	4.91	5.87	5.01	5.68
Mean	4.66	3.14	3.69	5.09	3.32	4.06

Total solids in soil include the fixed (inorganic) and volatile (organic) fractions. These values can be used to assess soil quality and management-induced changes. The total solids at the facility have a 6-year average of 84% and have remained steady. As seen in Table 13, the percent total solids become predictably elevated after irrigation with recycled water. Soil percent total solids have been adequately characterized in previous soil sampling so staff will not recommend that the draft permit continue require monitoring for soil percent total solids.

Table 13. Heyburn State Park facility soil percent total solids averaging all three sampling depths (0–12, 12–24, and 24–36 inches) for operating years 2012 through 2016.

Year	April	October
	Percent	
2012	76.4	86.1
2013	79.0	88.9
2014	80.1	93.1
2015	78.3	93.3
2016	80.8	86.7
Mean	78.9	89.6

Soil pH measurement is useful because it predicts various chemical activities and indicates the balance for available nutrients. Soil microbes prefer slightly acidic soils and are important for converting nutrients into plant-available forms. Facility soil samples dating from 2011 through 2016 had an average pH range of 4.97 to 7.98 with a mean of 6.20. Maintaining proper soil pH is an important aspect of soil fertility. Staff recommends that the draft permit continue to require soil pH monitoring.

Nitrate-nitrogen concentrations in soil samples were low to very low for typical Idaho soil (DEQ 2007, section 2.5.1, pp. 2-57, 2-58). Nitrogen has not been accumulating in the soil and has not likely migrated to the ground water. It is generally expected that the ammonia-nitrogen and nitrate-nitrogen would be elevated after a season of irrigation, but the soil appears to be recovering in the spring as seen in Figures 9 and 10.

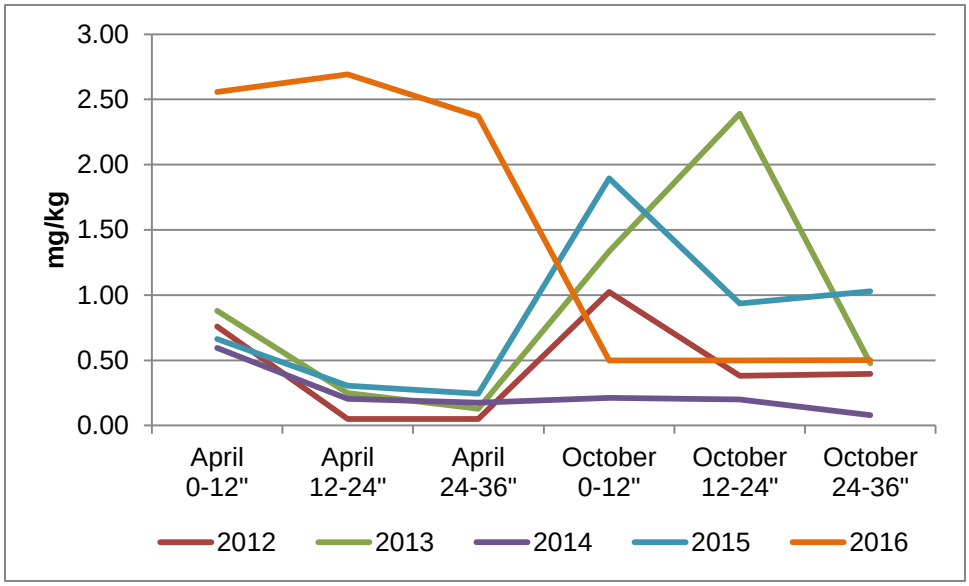
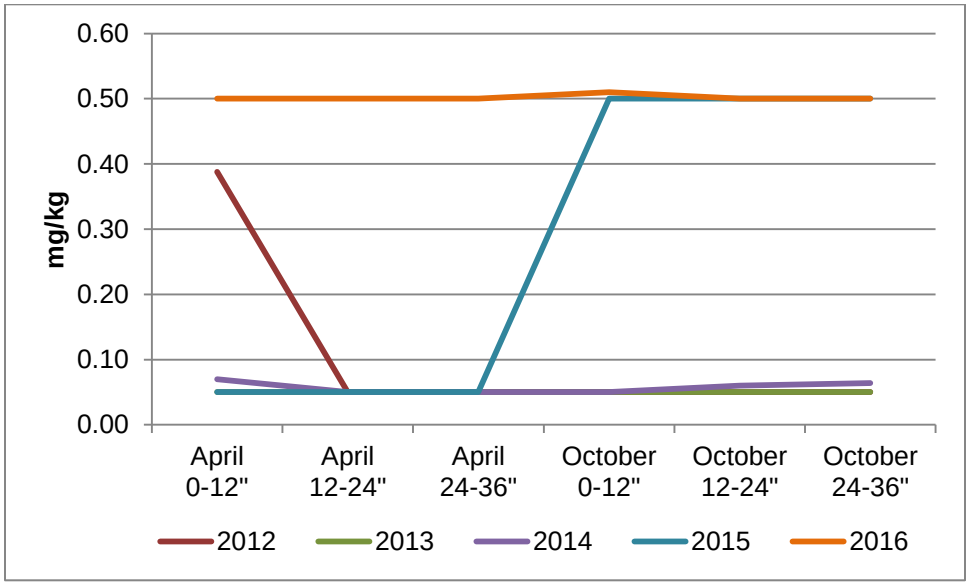


Figure 9. Heyburn State Park facility average soil ammonia-nitrogen levels at three depths by operating year measured in milligram per kilogram.



Note: In mid-2015, the facility changed from one analytical laboratory to another, which shifted the laboratory practical quantitation limit.

Figure 10. Heyburn State Park facility average soil nitrate-nitrogen levels at three depths by operating year measured in milligram per kilogram.

Ammonia-nitrogen concentrations are higher in the top layer of the soil than in the lower layers of the soil profile. Nitrate-nitrogen had no significant differences throughout the soil profile. This result is expected considering that ammonia-nitrogen attaches to soil whereas nitrate-nitrogen is soluble in water and moves with the water throughout the soil profile. Both ammonia-nitrogen and nitrate-nitrogen have historically remained at low levels and are not accumulating in the soil. As a means of monitoring the effectiveness of nitrogen uptake rates by the vegetation over the 10-year permit cycle, it is recommended that the draft permit continue to require monitoring of soil ammonia-nitrogen and nitrate-nitrogen.

Phosphorous can be present in soil as orthophosphate (plant-available phosphorus), polyphosphate, and organic phosphate. Levels of orthophosphate in Idaho soils can range from low (0 to 15 mg/kg) to very high (greater than 51 mg/kg) (DEQ 2007, section 2.5.1, p. 2-57). Phosphorus can be stored in the soil by precipitation and adsorption to soil particles. With significant loadings, phosphorus can migrate to lower soil levels with the risk of breaking through to ground water (DEQ 2007, section 4.2.2.7, p. 4-31).

The HSP facility orthophosphate levels in the soil have historically ranged from 76.6 to less than 2.6 mg/kg with substantial soil recovery in the spring as seen in Figure 11 (also see Section 4.3).

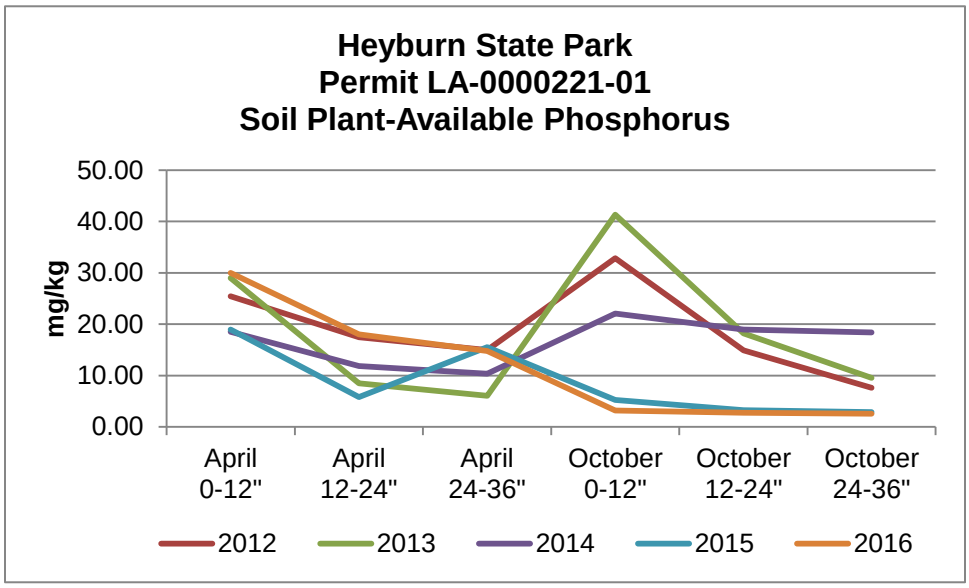


Figure 11. Heyburn State Park facility average soil plant-available phosphorus levels at three depths by operating year measured in milligram per kilogram.

The facility requested a reduction in soil sampling frequency. Staff recommends that the draft permit includes a requirement for annual monitoring in April prior to starting irrigation and eliminate the requirement for October soil sampling. This will continue to provide the ability to evaluate long-term trends in the soil chemistry and indirectly assess whether impacts to ground water and surface waters could be occurring from the irrigation of recycled water on the site.

The current permit requires soil monitoring of each of the five (5) soil management units which vary in size from 3.75 acres to 4.81 acres. The total acreage permitted for irrigation is 20.49 acres. The facility has historically irrigated the management units relatively evenly. Staff recommends that the draft permit specify one (1) soil management unit covering the 20.49 acres. HSP will need to update the Plan of Operation to include a new procedure for collecting representative samples across the 20.49 acres which are composited by depth into three (3) samples to be analyzed. This will reduce the number of soil samples analyzed from 15 to three (3).

Staff recommends that the draft permit require that the following soil constituents to be monitored in the irrigated MUs, as follows:

- Nitrate-nitrogen;
- Ammonium nitrogen;
- Plant-available phosphorus; and
- pH

6.3 Ground Water Monitoring

Ground water monitoring is typically used to evaluate a facility's impact on ground water quality and serves to assess compliance with the "Ground Water Quality Rule" (IDAPA 58.01.11). The draft permit does not include ground water monitoring requirements because detectable impacts are not anticipated as a result of irrigating recycled water on the site.

6.4 Supplemental Irrigation Water Monitoring

Supplemental irrigation water is not required at the facility.

6.5 Crop Yield and Tissue Monitoring

Crop yield and tissue monitoring are generally not required for forested sites. The draft permit does not contain requirements for tissue monitoring or crop yield measurement.

6.6 Meteorological Monitoring

Meteorological monitoring will not be required in the draft permit as there are a sufficient number of meteorological monitoring stations located within the region.

6.7 Calculation Methodologies

Hydraulic loading to the irrigation sites will be measured by the flow meter located in the irrigation pump building. Hydraulic loading will be reported in both million-gallons and acre-inches/acre. Methods for calculating IWR are described in Section 4.6.2. Annual nutrient loading should be calculated by summing the monthly nutrient loading rates. Equation 3 provides the method for calculating the nutrient loading.

Equation 3. Nutrient loading.

$$Nutrient\ Loading\ (\frac{lb}{acre}) = (Volume * Concentration * 8.34)/Area$$

Where:
Volume = Volume of effluent applied to MU in MG
Concentration = Constituent concentration in mg/L
Area = Area (MU) for which loading is being calculated in acres

7 Quality Assurance Project Plan

The QAPP outlines the procedures used by the permittee to ensure the data collected and analyzed meet the requirements of the permit.

To support the agency's mission, DEQ is dedicated to using and providing objective, correct, reliable, and understandable information. Decisions made by DEQ are subject to public review and may at times, be subject to rigorous scrutiny. Therefore, DEQ's goal is to ensure that all decisions are based on data of known and acceptable quality.

The QAPP is a permit requirement and must be submitted to DEQ as a stand-alone document for review and acceptance. The QAPP is used to assist the permittee in planning for the collection, analysis, and reporting of all monitoring data in support of the reuse permit and explaining data anomalies when they occur.

DEQ does not approve QAPPs but reviews them to determine if the minimum United States Environmental Protection Agency (EPA) guideline requirements are met and the reuse permit requirements are satisfied. DEQ does not approve QAPPs because the responsibility for validating the facility's sampling data lies with the permittee's quality assurance officer and not with DEQ.
The QAPP's format should adhere to the recommendations and references in (1) the Assurance and Data Processing sections of the DEQ Guidance and (2) EPA's QAPP guidance documents. EPA's QAPP guidance documents are available at
https://www.epa.gov/quality/epa-quality-management-tools-projects#qa-plans.

The facility submitted a QAPP on November 5, 2012. The draft permit will include a compliance activity requiring an updated QAPP be created and submitted to DEQ.

8 Site Operation and Maintenance

The HSP facility is classified as a Class I wastewater collection and treatment system. The DEQ classification worksheets were updated November 10, 2015. A land application license is also required to operate the system. The facility is operated by IDPR Heyburn State Park, and backup operations are contracted through E3WC. The responsible charge operator, Chris Hoosick with IDPR, holds licenses in Wastewater Treatment Class I (WWT1-18949), Wastewater Collections Class I (WWC1-18948), and Wastewater Treatment Land Application (WWTLA-19687). Jason Wereley with E3WC is the substitute responsible charge operator and holds licenses in Wastewater Treatment Class III (WWT3-13344), Wastewater Collections II (WWC2-11758), and Wastewater Treatment Land Application (WWTLA-13932).

9 Compliance Activities

9.1 Status of Compliance Activities in Current Permit

The compliance activities from the current permit DEQ 2011b (section E, p. 6) are presented in Table 14 with the current status.

Table 14. Permit LA-0000221-1 compliance activities and standing.

Compliance Activity	Description	Due Date	Status
CA-0221-01	Plan of Operation	6 months after permit issuance (November 6, 2011)	Submitted November 5, 2012
CA-0221-02	Permit Renewal Application	180 days before permit expiration (November 6, 2016)	Submitted November 10, 2016. Accepted as complete December 7, 2016. Preliminary decision to issue a draft permit on January 18, 2017.

9.2 Compliance Activities Required in New Permit

The following compliance activities are specified in the draft permit; plan of operation (PO), QAPP, seepage testing, silvicultural plan, preapplication workshop, and permit renewal application.

CA-221-01 The permittee shall submit for review and approval a PO that reflects current operations and incorporates the requirements of this permit within 12 months of permit issuance. The PO shall comply with the applicable requirements stated in IDAPA 58.01.17.300.05 and shall address appropriate items in the PO checklist provided in the DEQ Guidance (DEQ 2007, section 1.9.3, p 1-72).

CA-221-02 The permittee shall prepare and implement a QAPP that incorporates all monitoring and reporting required by this permit. A copy of the QAPP along with written notice that the permittee has implemented the QAPP shall be provided to DEQ within 12 months of permit issuance.

The QAPP's format and content should adhere to the recommendations and references in the Quality Assurance and Data Processing sections of the DEQ Guidance (DEQ 2007, section 7.1.6, p. 7-8).

The permittee shall amend the QAPP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAPP. The permittee shall notify DEQ of material changes to the QAPP, and copies shall be kept on site and made available to DEQ upon request.

CA-221-03 Seepage testing of the aeration lagoons, settling lagoons, and storage lagoons is required during the permit period. Submit to DEQ for review and approval a planned procedure for performing the required seepage tests at least 42 days before the planned seepage test. The seepage test procedures shall be sealed by the Idaho licensed professional engineer or professional geologist in responsible charge for the test.

CA-221-04 An updated silvicultural plan for the irrigation site prepared by a professional silviculturist (forester) shall be submitted to DEQ within three (3) years of permit issuance. The plan must include recommendations for land management activities that will maximize ET and nutrient uptake, nutrient uptake estimates, thinning, and interplanting.

CA-221-05 Conduct a preapplication workshop one (1) year before permit expiration to discuss the compliance status of the facility and the content required for the reuse permit application package.

CA-221-06 The permittee shall submit to DEQ a complete permit renewal application package six (6) months before permit expiration, which fulfills the requirements specified at the preapplication workshop.

10 Recommendations

Staff recommends issuing the draft reuse permit for ten (10) years. The draft permit specifies the following: hydraulic and constituent loading limits; compliance conditions to be performed; and monitoring and reporting requirements to evaluate system performance, environmental impacts, and permit compliance.

11 References

Allen, R. and C. Robison. 2012. *Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho: Supplement Updating the Time Series through December 2008.* Research Technical Completion Report. University of Idaho, Moscow, ID: Kimberly Research and Extension Center. *http://data.kimberly.uidaho.edu/ETIdaho/*.

Beckham, J. 2008. *Well Drillers Report*. Boise, ID: Idaho Department of Water Resources.

Benson, E. 2017. *Idaho Department of Parks and Recreation Heyburn State Park Permit, 2016 Annual Report*. Coeur d'Alene, ID: Welch Comer Engineers.

Bishop, D. 1969. *Stratigraphy and Distribution of Basalt, Benewah County, Idaho. Idaho Bureau of Mines and Geology*. Moscow, ID. *http://www.idahogeology.org/PDF/Pamphlets_(P)/P-140.pdf*.

BLM (Bureau of Land Management). 2017. *General Land Management Records*. Department of the Interior. *https://glorecords.blm.gov/search/default.aspx#searchTabIndex=0&searchByTypeIndex=1*.

DEQ (Idaho Department of Environmental Quality). 2007. *Guidance for Reclamation and Reuse of Municipal and Industrial Wastewater*. Boise, ID: DEQ. *http://www.deq.idaho.gov/media/516329-guidance_reuse_0907.pdf.*

DEQ (Idaho Department of Environmental Quality). 2010. Correspondence from DEQ to J. Aulbach, Pharmer Engineering, LLC. Coeur d'Alene, ID: DEQ.

DEQ (Idaho Department of Environmental Quality). 2011a. *Staff Analysis for the Draft Wastewater Reuse Permit LA-0000221-01, Heyburn State Park*. Coeur d'Alene, ID: DEQ.

DEQ (Idaho Department of Environmental Quality). 2011b. *Heyburn State Park, Municipal Wastewater Reuse Permit LA-0000221-01*. Coeur d'Alene, ID: DEQ.

DEQ (Idaho Department of Environmental Quality). 2012. *Guidance for Forested/Poplar Site Nutrient and Hydraulic Loading*. Boise, ID: DEQ.

FEMA (Federal Emergency Management Agency). 2009. *FEMA Flood Map Service Center: Search by Address*. *http://msc.fema.gov/portal*

Hipwell, C. 2010. *Seepage Testing Report, Heyburn State Park Wastewater Treatment Facility, Plummer, Idaho*. Boise, ID: Pharmer Engineering LLC.

Hise, R. 2017. Heyburn State Park Manager. Personal Communication with DEQ. Plummer, ID: Idaho Department of Parks and Recreation.

Kolb, P. 2017. *Forestland Grazing: Understory Forage Management*. Missoula, MT: Montana State University. *http://www.msuextension.org/forestry/Resources/pdf/FF_Forestland%20Grazing_PK.pdf*

Morse, S. 2008. *Computing Distances between Latitudes/Longitudes in One Step*. San Francisco, CA. *http://stevemorse.org/nearest/distance.php*.

NRCS (Natural Resource Conservation Service). 1998. *Nutrients Available from Livestock Manure Relative to Crop Growth Requirements*. Appendix I: Nutrient Uptake and Removal-Part C, Non-Grazed Privately Owned Woodland. *http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/?cid=nrcs143_014175.*

NRCS (Natural Resource Conservation Service). 2017. *Web Soil Survey*. United States Department of Agriculture. *https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx*

Rupert, M., C. Hunt, Jr., K. Skinner, L. Frans, and B. Mahler. 2014. *Groundwater Quality in the Columbia Plateau and Snake River Plain Basin-Fill and Basaltic-Rock Aquifers and the Hawaiian Volcanic-Rock Aquifers, Washington, Idaho, and Hawaii, 1993–2005*. U.S. Department of the Interior. *https://pubs.usgs.gov/circ/1359/*.

USGS (United States Geological Survey). 2017. *The National Map*. United States Department of the Interior. *https://nationalmap.gov/elevation.html*.

Warrick, P. 2008. *Geotechnical Engineering Evaluation Proposed Central Sewage Collection and Treatment Facility Heyburn State Park, Benewah County, Idaho*. Boise, ID: Strata, Inc.

Wheeler, R. and R. Wheeler. 2008. *Report for the Heyburn State Park Proposed Application of Waste Water on a Coniferous Forest Area*. Coeur d'Alene, ID. Idaho Panhandle Forestry Consultants.

Whitehead, R. 1994. *Ground Water Atlas of the United States; Idaho, Oregon, Washington.* Publication HA 730-H. Reston, VA: United States Geological Survey. *https://pubs.usgs.gov/ha/730h/report.pdf*.

Williams, A. 2015. *Heyburn State Park Wastewater Reuse Permit Technical Report*. Coeur d'Alene, ID: Welch Comer Engineers.

Wilson, S. 2009. *Heyburn State Park Revised Reuse Application Technical Report*. Boise, ID: Brown and Caldwell.

Wilson, S. 2012. *Operations & Maintenance Manual, Heyburn State Park Wastewater Treatment Facility*. Boise, ID: Brown and Caldwell.

WRCC (Western Regional Climate Center). 2013. Idaho Climate Summaries. *http://wrcc.dri.edu/cgi-bin/cliMAIN.pl?idsand*.

Appendix A. Site Maps

1. Regional Map

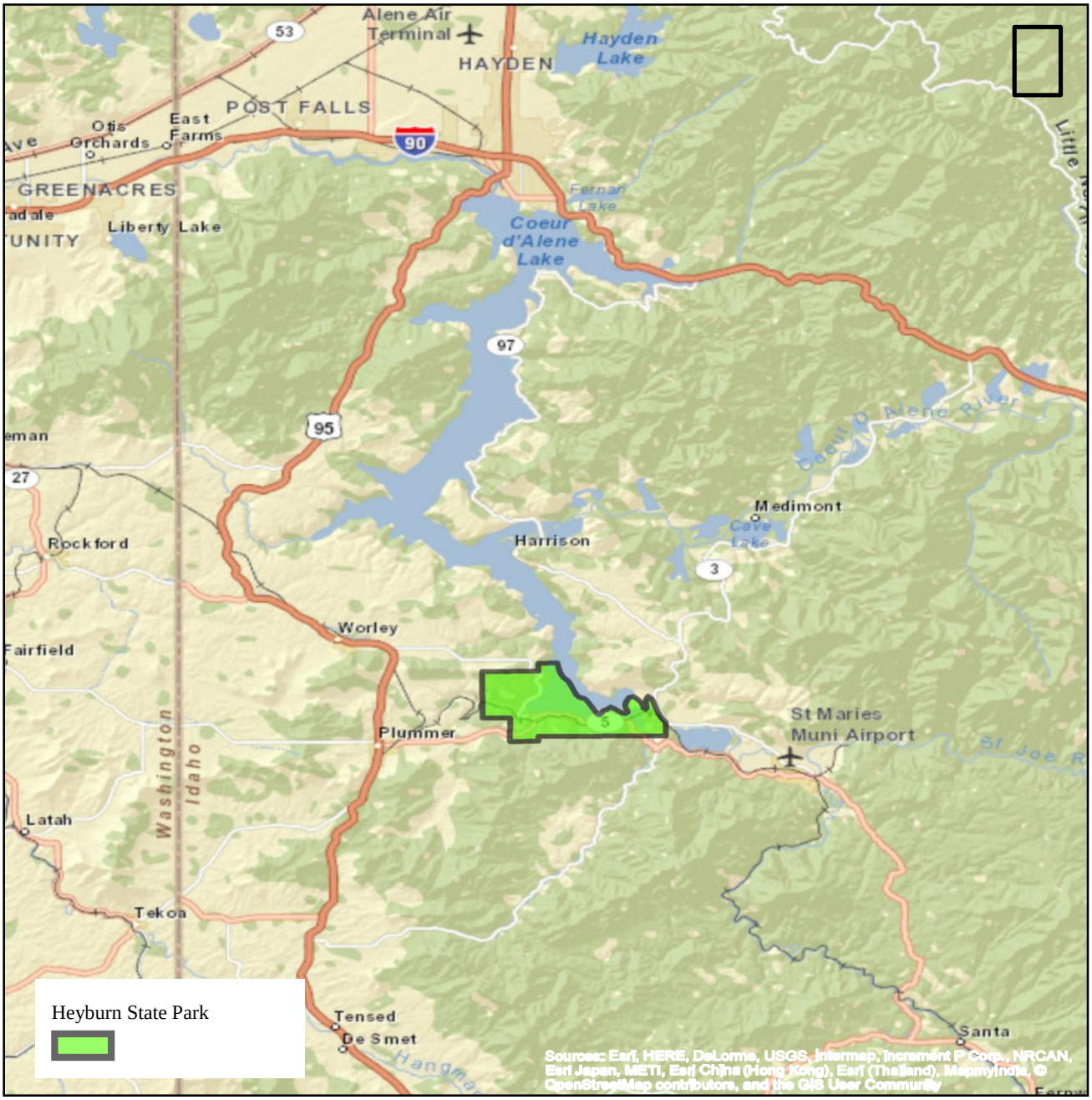


Figure 1. Heyburn State Park regional map (Williams 2015).

2. Facility Map of Treatment Lagoons

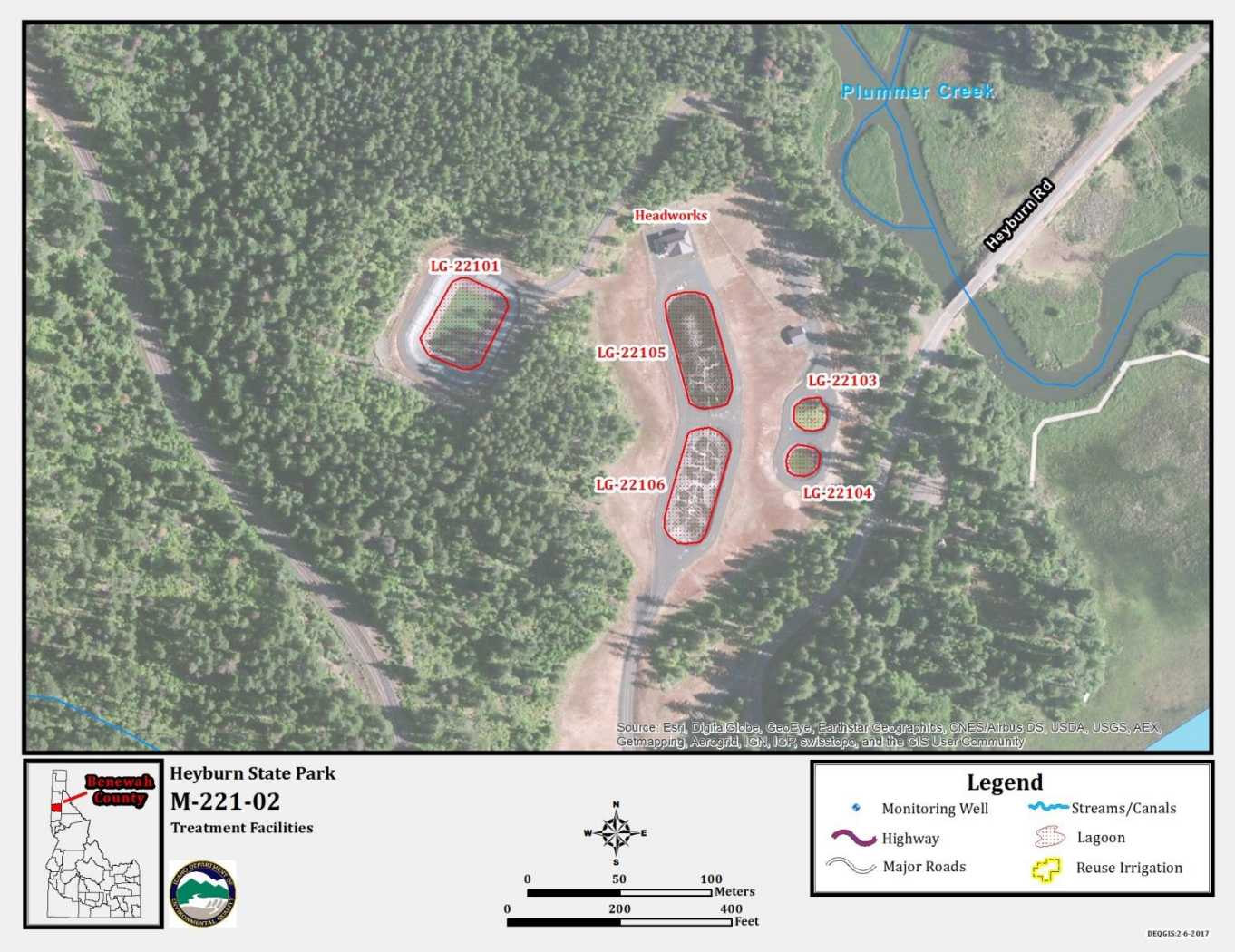


Figure 2. Heyburn State Park facility showing wastewater treatment lagoons (Williams 2015).

3. Facility Map of Management Units

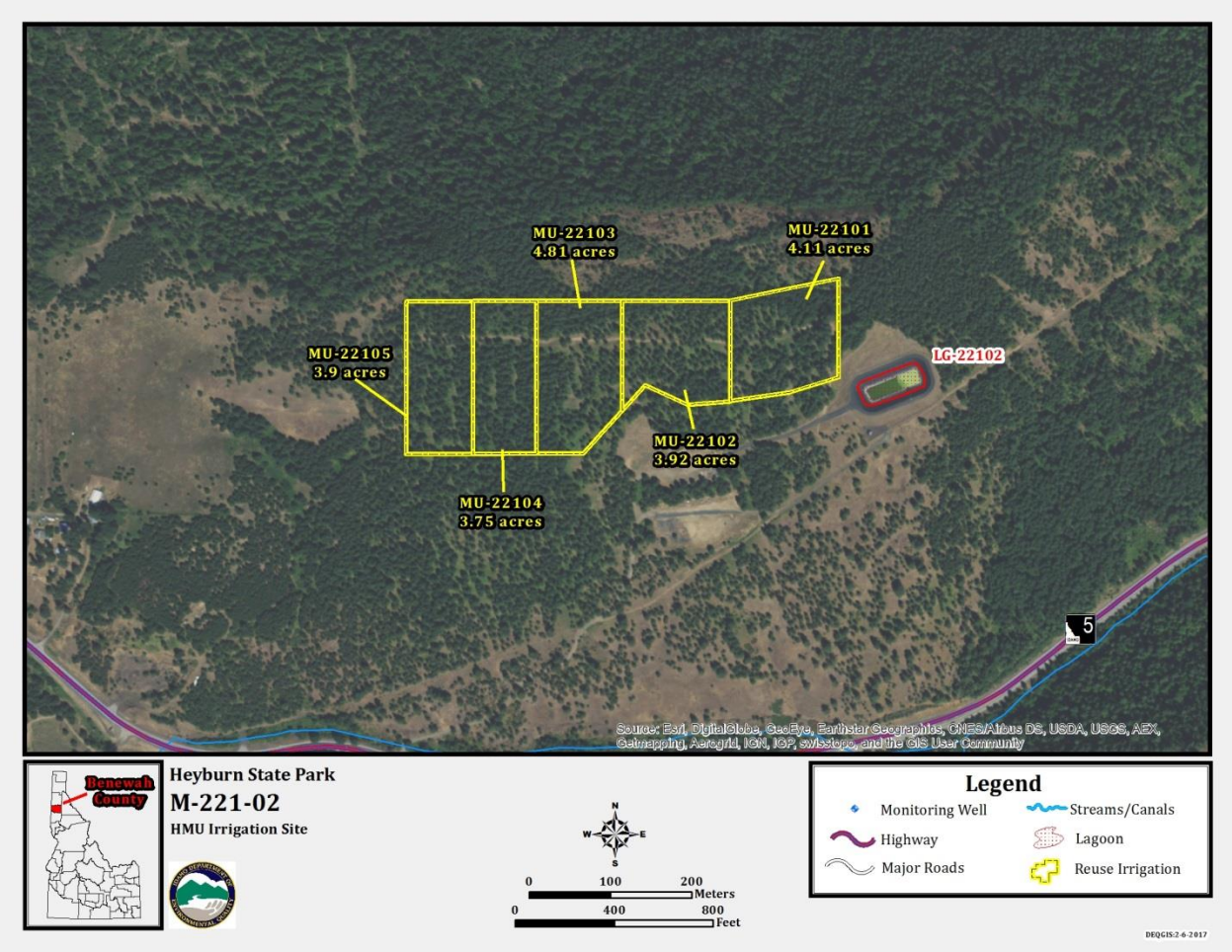


Figure 3. Heyburn State Park facility showing MUs and storage lagoon 2.

Appendix B: Permit

Idaho Department of Environmental Quality
Reuse Permit
M-221-02

(Previous Permit No. LA-0000221-01)

Idaho Department of Parks and Recreation, Heyburn State Park (hereafter "permittee") is hereby authorized to construct, install, and operate a reuse facility in accordance with (1) this permit; (2) IDAPA 58.01.17 "Recycled Water Rules"; (3) an approved plan of operation; and (4) all other applicable federal, state, and local laws, statutes, and rules. This permit is effective from the date of signature and expires on May 9, 2028.

Signature

May 9, 2018
Date

Daniel Redline
Regional Administrator
Coeur d'Alene Regional Office
Idaho Department of Environmental Quality

Idaho Department of Environmental Quality
Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
208-769-1422

This page intentionally left blank for correct double-sided printing.

Table of Contents

1. Common Acronyms/Abbreviations and Definitions 5
2. Facility Information 7
3. Compliance Schedule for Required Activities 8
4. Permit Limits and Conditions 11
4.1 Management Unit Descriptions 11
4.2 Hydraulic Loading Limits 11
4.3 Constituent Loading Limits 12
4.4 Management Unit Buffer Zones 12
a. Intended to reduce conflicts with wildlife. 12
4.5 Other Permit Limits and Conditions 12
5. Monitoring Requirements 14
5.1 Recycled Water Sampling and Analyses 14
5.1.1 Constituent Monitoring 14
5.1.2 Management Unit and Other Flow Monitoring 15
5.2 Soil Monitoring 15
5.2.1 Soil Monitoring Unit Descriptions 15
5.2.2 Soil Monitoring, Sampling, and Analyses 15
5.3 Forest Management Monitoring 16
5.4 Lagoon Information 16
6. Reporting Requirements 17
6.1 Annual Report Requirements 17
6.1.1 Due Date 17
6.1.2 Required Contents 17
6.1.3 Submittals 18
6.2 Emergency and Noncompliance Reporting 19
7. Reserved 21
8. Standard Permit Conditions 21
9. General Permit Conditions 23
9.1 Operations 23
9.1.1 Backflow Prevention 23
9.1.2 Restricted to Premises 23
9.1.3 Health Hazards, Nuisances, and Odors Prohibited 24
9.1.4 Solids Management 24
9.1.5 Temporary Cessation of Operations and Closure (IDAPA 58.01.17.801) 25
9.1.6 Plan of Operation (IDAPA 58.01.17.300.05) 25
9.1.7 Seepage Testing Requirements (IDAPA 58.01.16.493.02.c) 25
9.1.8 Ground Water Quality Rule (IDAPA 58.01.11) 26
9.2 Administrative 26
9.2.1 Permit Modification (IDAPA 58.01.17.700) 26
9.2.2 Permit Transferable (IDAPA 58.01.17.800) 26
9.2.3 Permit Revocation (IDAPA 58.01.17.920) 26
9.2.4 Violations (IDAPA 58.01.17.930) 27
9.2.5 Severability 27

10. Other Applicable Laws 28
10.1 Owner Responsibilities for Well Use and Maintenance 28
10.1.1 Well Use 28
10.1.2 Well Maintenance 28
10.1.3 Wells Posing a Threat to Human Health and Safety or Causing Contamination of the Ground Water Resource 28
11. Site Maps 29
11.1 Regional Map ..... **Error! Bookmark not defined.**
11.2 Facility Map and Surface Water 29
11.3 Facility Map of Treatment Lagoons and Storage Lagoon #1 30
11.4 Facility Map of Management Units and Storage Lagoon #2 31

1. Common Acronyms/Abbreviations and Definitions

CA	compliance activity
COD	chemical oxygen demand
cwt	a unit of weight measurement equal to 100 pounds
DEQ	Idaho Department of Environmental Quality
director	DEQ director or designee unless otherwise specified
Ei	irrigation efficiency
EPA	United States Environmental Protection Agency
FM	prefix for flow measurement/monitoring location, device, or method reporting serial number
GW	prefix for ground water reporting serial number
IDAPA	Numbering designation for all administrative rules in Idaho promulgated according to the Idaho Administrative Procedure Act
IDWR	Idaho Department of Water Resources
IWR	irrigation water requirement — any combination of wastewater and supplemental irrigation water applied at rates commensurate to the moisture requirements of the crop, and calculated monthly during the growing season.
lb	pound
LG	prefix for lagoon reporting serial number
material change	a change in a document required by this permit that would impact DEQ's ability to ensure compliance and protect human health and the environment
µmhos/cm	micromhos per centimeter
MG	million gallons
mg/kg	milligram per kilogram
mg/L	milligram per liter
mL	milliliter
MU	management unit, prefix for management unit reporting environmental serial number
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
N	nitrogen
ppm	parts per million
P	phosphorus

PO	plan of operation
QAPP	quality assurance project plan
responsible official	facility contact person authorized by the permittee to communicate with DEQ on behalf of the permittee on any matter related to the permit, including without limitation, the authority to communicate with and receive notices from DEQ regarding notices of violation or non-compliance, permit violations, permit enforcement, and permit revocation. The responsible official provides written certification of permit application materials, annual report submittals, and other information submitted to DEQ as required by the permit. Any notice to or communication with the responsible official is considered a notice to or communication with the permittee. The responsible official may designate an authorized representative to act as the facility contact person for any of the activities or duties related to the permit, except signing and certifying the permit application, which must be done by the responsible official. The authorized representative shall act as the responsible official and shall bind the permittee as described in this definition. Designation of the authorized representative shall follow the requirements specified in section 6.1.3 of the permit.
SU	prefix for soil monitoring unit reporting serial number
SW	prefix for supplemental irrigation water reporting serial number
WW	prefix for wastewater reporting serial number
yr	year

2. Facility Information

Information Type	Information Specific to This Permit
Type(s) of recycled water	Class C Municipal Wastewater
Method of treatment and reuse	Aerated lagoons, chlorine disinfection, and slow rate land treatment
For public municipal systems, specify the collection and treatment system classification. See IDAPA 58.01.16.202.01.a	Wastewater collection system classification: Class II Wastewater treatment system classification: Class I
Facility location	Treatment lagoons: Off Chatcolet Lower Road about 0.75 miles from the intersection of Chatcolet Lower Road and State Highway 5. Reuse site: About 0.6 miles south of the treatment lagoons off State Highway 5. T46N, R4W, Section 1 – Treatment lagoons T46N, R4W, Section 12 – Storage lagoon and irrigated acreage
Facility mailing address	Heyburn State Park 57 Chatcolet Lower Road Plummer, ID 83851
Facility responsible official and authorized representative	Responsible Official: Jim Thomas, Development Bureau Chief Idaho Department of Parks and Recreation 5657 Warm Springs Avenue Boise, ID 83716 Phone: (208) 514-2456 Fax: (208) 334-5253 Authorized Representative: Ron Hise, Heyburn State Park Manager 57 Chatcolet Lower Road Plummer, ID 83851 Phone: (208) 686-1308 Fax: (208) 686-3003 ron.hise@idpr.idaho.gov Notify DEQ within 30 days if there is a change in personnel for any of the above facility contacts. A minor permit modification will be issued by DEQ to confirm the change.
Ground water	Ground water is estimated to be less than 10 to 50 feet below ground surface. Beneficial uses: Domestic water supply. Nearby Public Water Supply wells: About one mile northeast of the irrigation site.

Surface water	Plummer Creek, located 0.6 miles north of the reuse site. Beneficial uses include cold water biota, salmonid spawning, and secondary contact recreation. Pedee Creek, located 0.25 miles east of the reuse site. Chatcolet Lake, located 0.4 miles northeast of the reuse site. Beneficial uses include recreational use and the propagation of fish, shellfish, and wildlife.

3. Compliance Schedule for Required Activities

Compliance Activity (CA) Number and Completion Due Date	Compliance Activity Description
CA-221-01 Within twelve (12) months of permit issuance	**Plan of Operation (PO)**: The permittee shall submit for review and approval a Plan of Operation that reflects current operations and incorporates the requirements of this permit. The PO shall comply with the applicable requirements stated in IDAPA 58.01.17.300.05 and shall address applicable items in the Plan of Operation Checklist in the DEQ Guidance. The PO shall include the following site management plans or the permittee may submit the site management plans individually: 1. Buffer zone plan; 2. Emergency operating plan; 3. Irrigation management and scheduling plan; 4. Nuisance and odor management plan; 5. Runoff management plan, The PO shall be updated as needed to reflect current operations. The permittee shall notify DEQ of material changes to the PO and copies shall be kept on site and made available to DEQ upon request.

Compliance Activity (CA) Number and Completion Due Date	Compliance Activity Description
CA-221-02 Within twelve (12) months of permit issuance	**Quality Assurance Project Plan (QAPP)**: The permittee shall prepare and implement a QAPP that incorporates all monitoring and reporting required by this permit. A copy of the QAPP along with written notice that the permittee has implemented the QAPP shall be provided to DEQ. The QAPP shall be designed to assist in planning for the collection, analysis, and reporting of all monitoring in support of this permit and in explaining data anomalies when they occur. At a minimum, the QAPP must include the following: 1. Details on the number of measurements, number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection, and quantitation limits for each target compound, type and number of quality assurance field samples, precision and accuracy requirements, sample preparation requirements, sample shipping methods, and laboratory data delivery requirements. 2. Maps indicating the location of each monitoring, and sampling point. 3. Qualification and training of personnel. 4. Names, addresses, and telephone numbers of the laboratories used by or proposed to be used by the permittee. 5. Example formats and tables that will be used by the permittee to summarize and present all data in the annual report. The format and content of the QAPP should adhere to the recommendations and references in the Quality Assurance and Data Processing sections of the DEQ Guidance. The permittee shall amend the QAPP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAPP. The permittee shall notify DEQ of material changes to the QAPP and copies shall be kept on site and made available to DEQ upon request.

<table>
<tr><th>Compliance Activity (CA) Number and Completion Due Date</th><th>Compliance Activity Description</th></tr>
<tr><td>CA-221-03
As specified</td><td>Seepage Testing: The following table shows the date by which the permittee shall complete seepage testing on the specified lagoons:
<table><tr><th>Lagoon</th><th>Seepage Test Due Date</th></tr><tr><td>Aeration Lagoon #1</td><td>August 31, 2020</td></tr><tr><td>Aeration Lagoon #2</td><td>August 31, 2020</td></tr><tr><td>Settling Lagoon #1</td><td>August 31, 2020</td></tr><tr><td>Settling Lagoon #2</td><td>August 31, 2020</td></tr><tr><td>Storage Lagoon #1</td><td>September 30, 2020</td></tr><tr><td>Storage Lagoon #2</td><td>October 31, 2020</td></tr></table>Submit to DEQ for review and approval a proposed schedule and procedure for performing the required seepage tests at least 45 days prior to the planned seepage test. Guidance for developing seepage test procedures are available at: http://www.deq.idaho.gov/water-quality/wastewater/lagoon-seepage-testing.aspx. The seepage test procedures shall be sealed by the Idaho licensed professional engineer or professional geologist in responsible charge for the test.

Seepage tests shall be completed in accordance with the procedures approved by DEQ. The seepage test report shall be sealed by the person in responsible charge and submitted within 90 days after completion of the seepage test.

For municipal lagoons, the leakage rate for lagoons constructed after April 15, 2007 shall be no more than zero point one hundred twenty-five (0.125) inches (1/8 inch) per day. All of the Heyburn State Park lagoons were constructed after April 15, 2007. Requirements for lagoons leaking above the allowable amount are outlined in IDAPA 58.01.16.493.04.</td></tr>
<tr><td>CA-221-04
Within three (3) years of permit issuance</td><td>Silvicultural Plan: An updated silvicultural plan for the reuse site shall be prepared by a professional silviculturist and submitted to DEQ for review and approval. This plan shall include the dominant vegetation species occupying the application site, estimated percentage of the application site occupied by each of the dominant species, land management activities that will maximize evapotranspiration and nutrient uptake, recommendations for the timing of thinning and interplanting, and the annual nutrient uptake expected for the dominant species present based on literature values with references provided. Once completed the silvicultural plan shall be included in the updated plan of operation.</td></tr>
<tr><td>CA-221-05
One (1) year prior to permit expiration</td><td>Pre-Application Workshop: When the permittee intends to continue operating the reuse facility beyond the expiration date of this permit, the permittee shall contact DEQ and schedule a pre-application workshop to discuss the compliance status of the facility and the content required for the reuse permit application package.</td></tr>
<tr><td>CA-221-06
Six (6) months prior to permit expiration</td><td>Renewal Permit Application: The permittee shall submit to DEQ a complete permit renewal application package, which fulfills the requirements specified at the pre-application workshop identified in CA-221-05.</td></tr>
</table>

4. Permit Limits and Conditions

4.1 Management Unit Descriptions

Serial Number	Description	Irrigation System Type and Irrigation Efficiency	Maximum Acres[a] Allowed
MU-22101	Zone #1	Solid Set, Above-Ground, Impact Sprinklers (Ei = 0.65)	4.11
MU-22102	Zone #2	Solid Set, Above-Ground, Impact Sprinklers (Ei = 0.65)	3.92
MU-22103	Zone #3	Solid Set, Above-Ground, Impact Sprinklers (Ei = 0.65)	4.81
MU-22104	Zone #4	Solid Set, Above-Ground, Impact Sprinklers (Ei = 0.65)	3.75
MU-22105	Zone #5	Solid Set, Above-Ground, Impact Sprinklers (Ei = 0.65)	3.90
		Total acreage	20.49

a. Maximum acres represent the total permitted acreage of the MU as provided by the permittee. If the permittee uses less acreage in any season or year, then loading rates shall be presented and compliance shall be determined based on the actual acreage utilized during each season or year.

4.2 Hydraulic Loading Limits

Serial Number	Growing Season Hydraulic Loading	Nongrowing Season Maximum Hydraulic Loading
MU-22101 MU-22102 MU-22103 MU-22104 MU-22105	Substantially at or below the irrigation water requirement (IWR)[a, b]	Not allowed

a. For compliance purposes, the source of P_{def} data used to calculate the IWR shall be specified in the PO.
b. The permittee will be required to provide justification for the calculated IWR each year in their annual report.

4.3 Constituent Loading Limits

Serial Number	Constituent Loading (from all sources)	
	Total Nitrogen	Total Phosphorus
MU-22101 MU-22102 MU-22103 MU-22104 MU-22105	119 lb/acre-year	20 lb/acre-year

4.4 Management Unit Buffer Zones

Serial Number	Public Water Supplies	Private Water Supplies	Inhabited Dwellings	Permanent and Intermittent Surface Water	Irrigation Ditches and Canals	Areas Accessible to the Public[a]
MU-22101 MU-22102 MU-22103 MU-22104 MU-22105	1,000	500	300	100	50	0

a. No fencing requirements.

4.5 Other Permit Limits and Conditions

Category	Permit Limits and Conditions
Growing season	April 1 through October 31 (214 days)
Nongrowing season	November 1 through March 31 (151 days)
Reporting year for annual loading rates	November 1 through October 31
Operator certification and endorsement	The wastewater treatment facility and reuse system shall be operated by personnel certified and licensed in the State of Idaho wastewater operator training program at the operator class level specified in IDAPA 58.01.16.203 and properly trained to operate and maintain the system.
Disinfection limits in recycled water	Class C: The median number of total coliform organisms does not exceed 23 total coliform organisms/100 mL, as determined from the bacteriological results of the last 5 days for which analyses have been completed. No sample shall exceed 230 total coliform organisms/100 mL in any confirmed sample.
Crop or vegetation allowed	Native forest
Grazing	Grazing is not allowed.

Category	Permit Limits and Conditions
Posting	Signs shall read “Warning: Recycled Water—Do Not Enter,” or equivalent. All new signs will include the warning in both English and Spanish. Signs to be posted every 100 feet and at each corner of the outer perimeter of the irrigated site.
Fencing	No fencing is required.
Construction plans	Pursuant to Idaho Code §39-118, IDAPA 58.01.16, and IDAPA 58.01.17, detailed plans and specifications shall be submitted to DEQ for review and approval prior to construction, modification, or expansion of any wastewater treatment, storage, conveyance structures, ground water monitoring wells, or reuse facility. Inspection requirements shall be satisfied and within 30 days of completion of construction, the permittee shall submit as-built plans or a letter from an Idaho Professional Engineer certifying the facilities or structures were constructed in substantial accordance with the approved plans and specifications.
Backflow prevention and testing requirements	Backflow prevention is required to protect surface water and ground water from an unauthorized discharge of recycled water or wastewater. Refer to section 9.1.1 of this permit.
Records retention requirements	Keep records generated to meet the requirements of this permit for the duration of permit, including administrative extensions, plus 2 years.
Flow measurement and calibration	Flow measurement devices used to directly or indirectly measure recycled water applied to each management unit shall be calibrated or verified in accordance with the device manufacturer’s specifications and included with the permittee’s QAPP or PO and discussed in each Annual Report.

5. Monitoring Requirements

5.1 Recycled Water Sampling and Analyses

5.1.1 Constituent Monitoring

Monitoring Point Serial Number and Location	Sample Description	Sample Type and Frequency	Constituents (Units in mg/L Unless Otherwise Specified)
WW-22101 Recycled water from sample tap after disinfection and prior to Storage Lagoon #2	Recycled water prior to discharge into Storage Lagoon #2 (LG-22102)	Grab/weekly (when irrigating)	- Total Coliform (colony forming units/100 mL)
		Grab/monthly (during months when no irrigation occurs)	- Total Coliform (colony forming units/100 mL)
		Grab/daily (when irrigating)	- Total Chlorine Residual
WW-22102 Recycled water from sample tap after Storage Lagoon #2 and prior to first sprinkler head	Recycled water from Storage Lagoon #2 (LG-22102) to each MU	Grab/monthly (when irrigating)	- Total Kjeldahl Nitrogen (TKN) - Nitrate+Nitrite-Nitrogen - Total Phosphorus

5.1.2 Management Unit and Other Flow Monitoring

Management Unit or Flow Measurement Serial Number and Location	Sample Description	Sample Type and Frequency	Measured Parameters, each MU or FM
FM-22101 Flow meter on irrigation pumps' discharge line located in irrigation pump building	Flow rate and volume of recycled water from Storage Lagoon #2 (LG-22102) to each MU	- Daily meter reading - Monthly compilation of data	- Flow (gallons/day) to each MU - Volume (MG/month) to each MU - Volume (inches/month) to each MU

5.2 Soil Monitoring

5.2.1 Soil Monitoring Unit Descriptions

Monitoring Point Serial Number	Description	Associated Hydraulic Management Unit
SU-22101	Zone #1, Zone #2, Zone #3, Zone #4, Zone #5	MU-22101, MU-22102, MU-22103, MU-22104, MU-22105

5.2.2 Soil Monitoring, Sampling, and Analyses

Monitoring Point Serial Number	Sample Type	Sample Frequency	Constituents (Units in mg/kg Soil Unless Otherwise Specified)
SU-22101	Composite samples[a]	Annually in the spring prior to starting irrigation for the growing season	- Plant-available nitrate-nitrogen - Plant-available ammonium nitrogen - Plant-available phosphorus - pH (standard units)

a. The number of sample locations specified in the PO or QAPP for each SU shall be sampled. At each location, samples shall be obtained from three depths: 0–12 inches; 12–24 inches; and 24–36 inches or refusal. The samples obtained from each depth shall be composited by depth to yield three composite samples for each soil monitoring unit; one composite sample for each depth.

5.3 Forest Management Monitoring

Associated Hydraulic Management Unit	Sample Type	Sample Frequency	Parameters[a]
MU-22101 MU-22102 MU-22103 MU-22104 MU-22105	Thinning and interplanting	Each event	- Event date - Event description

a. Documentation shall be provided for each event from each MU.

5.4 Lagoon Information

Serial Number	Description	Surface Area, acres	Maximum Operating Volume, MG	Liner Type
LG-22101	Storage Lagoon #1	0.827	1.86	HDPE[a]
LG-22102	Storage Lagoon #2	1.074	2.50	HDPE
LG-22103	Settling Lagoon #1	0.122	0.069	HDPE
LG-22104	Settling Lagoon #2	0.122	0.069	HDPE
LG-22105	Aeration Lagoon #1	0.465	0.57	HDPE
LG-22106	Aeration Lagoon #2	0.465	0.57	HDPE

a. Welded 60 mils (0.060 inches thick) high density polyethylene liner.

6. Reporting Requirements

6.1 Annual Report Requirements

The permittee shall submit to DEQ an Annual Report prepared by a competent environmental professional covering the previous reporting year.

6.1.1 Due Date

The Annual Report is due no later than January 31 of each year, which shall cover the previous reporting year.

6.1.2 Required Contents

The Annual Report shall include the following:

1. A brief interpretive discussion of all required monitoring data. The discussion shall address data quality objectives, validation, and verification; permit compliance; and reuse facility environmental impacts. The reporting year for this permit is specified in Section 4.5.
2. Results of the required monitoring as described in Section 5 of this permit. If the permittee monitors any parameter for compliance purposes more frequently than required by this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Annual Report. The report shall present all monitoring data in organized data summary tables to expedite review.
3. Status of all work described in Section 3 of this permit.
4. Results of all backflow testing, repairs, and replacements required by Section 9.1.1 of this permit.
5. Discussion of major maintenance activities such as major equipment replacement, lagoon liner maintenance, and wastewater treatment and reuse facility maintenance.
6. A summary of all noncompliance events that occurred during the reporting year. Examples of noncompliance events that must be discussed include, but are not limited to: exceedance of permit limits, complaints, missed monitoring events, incorrect monitoring dates or frequencies, dry monitoring wells, uncontained spills causing runoff, construction without DEQ engineering plan approval, construction without engineering inspection, and reporting incorrect acreage.
7. Submittal of the calculations and observations for hydraulic management units specified in the table below.
8. Laboratory analytical reports for monitoring specified in Section 5 of the permit. Chain of custody forms, supporting information for laboratory analytical reports, and quality assurance documentation shall be available for review upon request by DEQ.
9. The parameters in the following table:

Monitoring Point Serial Number	Parameter (Calculate for each MU)	Units
MU-22101 MU-22102 MU-22103 MU-22104 MU-22105	Recycled water loading rate	- Million gallons/month - Inches/month
	Irrigation water requirement (IWR)	- Inches/month - Inches/growing season
	Recycled water nitrogen and phosphorus loading rates	- Pounds/acre-year
	Plant available soil nutrients and pH in spring	- milligram/kilogram (mg/kg) - pH units
	Forest thinning and interplanting	- Event date - Event description
Other Reporting Requirements: 1. Provide records of when and how much recycled water is pumped from LG-22101 to LG-22102. 2. Report the most recent calibration or verification date of FM-22101 and the result.		

6.1.3 Submittals

All applications, annual reports, or information submitted to DEQ as required by this permit shall be signed and certified as follows:

1. Permit applications shall be signed by the Responsible Official as follows:
    a. For a corporation: by a responsible corporate officer;
    b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;
    c. For a municipality, state, federal, Indian tribe, or other public agency: by either the principal executive officer, ranking elected official, or a person of decision-making authority who can legally bind the permittee with respect to the permit.
2. Annual reports and other information required by this permit shall be signed by the Responsible Official or by a duly Authorized Representative of that person. A person is a duly Authorized Representative only if:
    a. The authorization is made in writing by the responsible official;
    b. The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual having overall responsibility for environmental matters for the company; and
    c. The written authorization is submitted to DEQ.

Submit all applications, annual reports, and other information required by this permit to the following DEQ regional office at this address:

Engineering Manager
Idaho Department of Environmental Quality
Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

The annual report shall include the following certification statement and be signed, dated, and certified by the permittee's Responsible Official or duly Authorized Representative:

"I certify that the information provided in this submittal was prepared in conformance with the Quality Assurance Project Plan required by permit M-003-04, and is to the best of my knowledge, true, accurate and complete and I acknowledge that knowing submission of false or incomplete information may result in permit revocation as provided for in IDAPA 58.01.17.920.01 or other enforcement action as provided for under Idaho law."

Permit applications shall include the following certification statement and be signed, dated, and certified by the permittee's Responsible Official:

"I certify that the information provided in this submittal is, to the best of my knowledge, true, accurate and complete and I acknowledge that knowing submission of false or incomplete information may result in permit revocation as provided for in IDAPA 58.01.17.920.01, non-issuance of the permit, or other enforcement action as provided for under Idaho law."

Other information submitted to DEQ as required by the permit shall include the above certification statement and be signed, dated, and certified by the permittee's Responsible Official or duly Authorized Representative.

6.2 Emergency and Noncompliance Reporting

Report noncompliance incidents to DEQ's Coeur d'Alene Regional Office at (208) 769-1422.

In case of emergencies, call the emergency 24-hour number at 1-800-632-8000 and DEQ's Coeur d'Alene Regional Office.

See Section 8, "Standard Permit Conditions," and IDAPA 58.01.17.500.06 for reporting requirements for facilities.

All instances of 1) permit non-compliance which may endanger public health or the environment and 2) unauthorized discharges to surface waters of the State of Idaho shall be reported to DEQ's regional office by telephone within 24 hours from the time the permittee becomes aware of the discharge at the phone numbers provided in this section.

A written follow-up shall be provided to the DEQ regional office within 5 days from the time the permittee became aware of the permit non-compliance or unauthorized discharge.

Reporting of unauthorized discharges to surface waters of the United States to the Environmental Protection Agency (EPA) may also be required. Contact information for EPA is provided below:

EPA Contact Information:
NPDES/Stormwater Coordinator, USEPA Idaho Operations Office
950 W. Bannock, Suite 900
Boise, ID 83702
(208) 378-5746 / (208) 378-5744 and EPA Hot Line (206) 553-1846

7. Reserved

8. Standard Permit Conditions

The following standard permit conditions are included as terms of this permit as required by the "Recycled Water Rules," (IDAPA 58.01.17.500).

500. STANDARD PERMIT CONDITIONS.
The following conditions shall apply to and be included in all permits. (4-1-88)

01. Compliance Required. The permittee shall comply with all conditions of the permit. (4-1-88)

02. Renewal Responsibilities. If the permittee intends to continue operation of the permitted facility after the expiration of an existing permit, the permittee shall apply for a new permit in accordance with these rules. (4-1-88)

03. Operation of Facilities. The permittee shall at all times properly maintain and operate all structures, systems, and equipment for treatment, control and monitoring, which are installed or used by the permittee to achieve compliance with the permit or these rules. (4-1-88)

04. Provide Information. The permittee shall furnish to the Director within a reasonable time, any information including copies of records, which may be requested by the Director to determine whether cause exists for modifying, revoking, re-issuing, or terminating the permit, or to determine compliance with the permit or these rules. (4-1-88)

05. Entry and Access. The permittee shall allow the Director, consistent with Title 39, Chapter 1, Idaho Code, to: (4-1-88)

a. Enter the permitted facility. (4-1-88)

b. Inspect any records that must be kept under the conditions of the permit. (4-1-88)

c. Inspect any facility, equipment, practice, or operation permitted or required by the permit. (4-1-88)

d. Sample or monitor for the purpose of assuring permit compliance, any substance or any parameter at the facility. (4-1-88)

06. Reporting. The permittee shall report to the Director under the circumstances and in the manner specified in this section: (4-1-88)

a. In writing at least thirty (30) days before any planned physical alteration or addition to the permitted facility or activity if that alteration or addition would result in any significant change in information that was submitted during the permit application process. When the alteration or addition results in a need for a major modification, such alteration or addition shall not be made prior to Department approval issued in accordance with these rules. (4-7-11)

b. In writing thirty (30) days before any anticipated change which would result in noncompliance with any permit condition or these rules. (4-1-88)

c. Orally within twenty-four (24) hours from the time the permittee became aware of any noncompliance which may endanger the public health or the environment at telephone numbers provided in the

permit by the Director. (4-1-88)

d. In writing as soon as possible but within five (5) days of the date the permittee knows or should know of any noncompliance unless extended by the Department. This report shall contain: (4-1-88)

i. A description of the noncompliance and its cause; (4-1-88)

ii. The period of noncompliance including to the extent possible, times and dates and, if the noncompliance has not been corrected, the anticipated length of time it is expected to continue; and (4-7-11)

iii. Steps taken or planned, including timelines, to reduce or eliminate the continuance or reoccurrence of the noncompliance. (4-7-11)

e. In writing as soon as possible after the permittee becomes aware of relevant facts not submitted or incorrect information submitted, in a permit application or any report to the Director. Those facts or the correct information shall be included as a part of this report. (4-1-88)

07. Minimize Impacts. The permittee shall take all necessary actions to eliminate and correct any adverse impact on the public health or the environment resulting from permit noncompliance. (4-1-88)

08. Compliance with "Ground Water Quality Rule." Permits issued pursuant to these rules shall require compliance with IDAPA 58.01.11, "Ground Water Quality Rule." (4-7-11)

9. General Permit Conditions

The following general permit conditions are based on the cited rules at the time of issuance and are enforceable as part of this permit. Note that the rules cited in this section, and elsewhere in this permit, are supplemented by the rules themselves. Rules applicable to your facility are enforceable whether or not they appear in this permit.

9.1 Operations

9.1.1 Backflow Prevention

Reuse facilities with existing or planned cross-connections or interconnections between the recycled water system and any water supply (potable or nonpotable) or surface water, shall have backflow prevention assemblies, devices, or methods as required by applicable rule or as specified in this permit and approved by DEQ.

For public water systems, backflow assemblies shall meet the requirements of IDAPA 58.01.08.543. Assemblies shall be adequately maintained and shall be tested annually by a certified backflow assembly tester, and repaired or replaced as necessary to maintain operational status.

For domestic water supply wells, backflow prevention devices shall meet the requirements of IDAPA 07.02.04 and shall be adequately operated and maintained.

Irrigation water supply wells shall meet the requirements of IDAPA 37.03.09.36 for preventing any waste or contamination of the ground water resource. Backflow prevention assemblies or devices used to protect the ground water shall be adequately operated and maintained.

Discharge of recycled water to surface water is regulated by the EPA NPDES program. An NPDES permit is required for any discharge to surface water and backflow prevention shall be implemented to prevent any unauthorized discharge. Backflow prevention assemblies or devices used to protect surface water shall be adequately operated and maintained.

Records of all testable backflow assembly test results, repairs, and replacements shall be kept at the reuse facility along with other operational records, and shall be discussed in the Annual Report and made available for inspection by DEQ. Other approved means of backflow prevention, such as siphons and air-gap structures that cannot be tested, shall be maintained in operable order.

9.1.2 Restricted to Premises

Wastewaters or recharge waters applied to the land surface must be restricted to the premises of the application site. Wastewater discharges to surface water that require a permit under the Clean Water Act must be authorized by the United States Environmental Protection Agency (IDAPA 58.01.16.600.02).

9.1.3 Health Hazards, Nuisances, and Odors Prohibited

Health hazards, nuisances, and odors are prohibited as follows:

- Wastewater must not create a public health hazard or nuisance condition (IDAPA 58.01.16.600.03).
- No person shall allow, suffer, cause or permit the emission of odorous gases, liquids, or solids into the atmosphere in such quantities as to cause air pollution (IDAPA 58.01.01.776.01).
  - Air Pollution. The presence in the outdoor atmosphere of any air pollutant or combination thereof in such quantity of such nature and duration and under such conditions as would be injurious to human health or welfare, to animal or plant life, or to property, or to interfere unreasonably with the enjoyment of life or property (IDAPA 58.01.01.006.06).

9.1.4 Solids Management

Biosolids are the nutrient-rich organic materials resulting from the treatment of sewage sludge. When treated and processed, sewage sludge becomes biosolids which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils and stimulate plant growth.

Biosolids generated from sewage sludge are regulated by EPA under 40 CFR Part 503 and require a DEQ approved sludge disposal plan as outlined in IDAPA 58.01.16.650. Contact DEQ prior to application of biosolids at any permitted reuse facility.

Sludge is the semi-liquid mass produced and removed by wastewater treatment processes. This does not include grit, garbage, and large solids.

Sludge may be generated by wastewater treatment processes at municipal and industrial facilities. A DEQ-approved sludge disposal plan, as outlined in IDAPA 58.01.16.650, may be required.

Solid Waste is any garbage or refuse, sludge from a waste water treatment plant, water supply treatment plant, or air pollution control facility and other discarded material including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended or source, special nuclear, or by-product material as defined by the Atomic Energy Act of 1954, as amended.

Solid waste does not include inert wastes, manures and crop residues ultimately returned to the soils at agronomic rates, and any agricultural solid waste which is managed and regulated pursuant to rules adopted by the Idaho Department of Agriculture. DEQ reserves the right to use existing authorities to regulate agricultural waste that impacts human health or the environment.

Solid waste is regulated under IDAPA 58.01.06, “Solid Waste Management Rules”. Wastes otherwise regulated by DEQ (i.e. this permit) are not regulated under 58.01.06.

Waste Solids include sludge and wastes otherwise regulated by DEQ in accordance with IDAPA 58.01.06.001.03.a.xii. Waste solids may include vegetative waste, silt and mud containing organic matter, and other non-inert solid wastes.

Inert wastes are defined as non-combustible, nonhazardous, and non-putrescible solid wastes that are likely to retain their physical and chemical structure and have a deminimis potential to generate leachate under expected conditions of disposal, which includes resistance to biological attack.

Waste solids require a DEQ approved sludge disposal plan as outlined in IDAPA 58.01.16.650.

9.1.5 Temporary Cessation of Operations and Closure (IDAPA 58.01.17.801)

Temporary cessation of operations and closure must be addressed as follows:

01. Temporary Cessation. A permittee shall implement any applicable conditions specified in the permit for temporary cessation of operations. When the permit does not specify applicable temporary cessation conditions, the permittee shall notify the Director prior to a temporary cessation of operations at the facility greater than sixty (60) days in duration and any cessation not for regular maintenance or repair. Cessation of operations necessary for regular maintenance or repair of a duration of sixty (60) days or less are not required to notify the Department under this section. All notifications required under this section shall include a proposed temporary cessation plan that will ensure the cessation of operations will not pose a threat to human health or the environment. (4-7-11)

02. Closure. A closure plan shall be required when a facility is closed voluntarily and when a permit is revoked or expires. A permittee shall implement any applicable conditions specified in the permit for closure of the facility. Unless otherwise directed by the terms of the permit or by the Director, the permittee shall submit a closure plan to the Director for approval at least ninety (90) days prior to ceasing operations. The closure plan shall ensure that the closed facility will not pose a threat to human health and the environment. Closure plan approval may be conditioned upon a permittee's agreement to complete such site investigations, monitoring, and any necessary remediation activities that may be required. (4-7-11)

9.1.6 Plan of Operation (IDAPA 58.01.17.300.05)

The PO must comply with the following:

05. Reuse Facility Operation and Maintenance Manual or Plan of Operations. A facility's operation and maintenance manual must contain all system components relating to the reuse facility in order to comply with IDAPA 58.01.16 "Wastewater Rules," Section 425. Manuals and manual amendments are subject to the review and approval provision therein. In addition to the content required by IDAPA 58.01.16.425, manuals for reuse facilities shall include, if applicable: operation and management responsibility, permits and standards, general plant description, operation and control of unit operations, land application site maps, wastewater characterization, cropping plan, hydraulic loading rate, constituent loading rates, compliance activities, seepage rate testing, site management plans, monitoring, site operations and maintenance, solids handling and processing, laboratory testing, general maintenance, records and reports, store room and inventory, personnel, an emergency operating plan, and any other information required by the Department. (4-7-11)

9.1.7 Seepage Testing Requirements (IDAPA 58.01.16.493.02.c)

Subsequent Tests. All lagoons covered under these rules must be seepage tested by an Idaho licensed professional engineer, an Idaho licensed professional geologist, or by individuals under their supervision every ten (10) years after the initial testing. (5-8-09)

9.1.8 Ground Water Quality Rule (IDAPA 58.01.11)

The permittee shall comply with the requirements of "Ground Water Quality Rule" (IDAPA 58.01.11).

9.2 Administrative

Requirements for administration of the permit are defined as follows.

9.2.1 Permit Modification (IDAPA 58.01.17.700)

01. Modification of Permits. A permit modification may be initiated by the receipt of a request for modification from the permittee, or may be initiated by the Department if one (1) or more of the following causes for modification exist: (4-7-11)

a. Alterations. There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit. (4-7-11)

b. New standards or regulations. The standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued. (4-7-11)

c. Compliance schedules. The Department determines good cause exists for modification of a compliance schedule or terms and conditions of a permit. (4-7-11)

d. Non-limited pollutants. When the level of discharge of any pollutant which is not limited in the permit exceeds the level which may cause an adverse impact to surface or ground waters. (4-7-11)

e. To correct technical mistakes, such as errors in calculation, or mistaken interpretations of law made in determining permit conditions. (4-7-11)

f. When a treatment technology proposed, installed, and properly operated and maintained by the permittee fails to achieve the requirements of the permit. (4-7-11)

9.2.2 Permit Transferable (IDAPA 58.01.17.800)

01. General. A permit may be transferred only upon approval of the Department. No transfer is required for a corporate name change as long as the secretary of state can verify that a change in name alone has occurred. An attempted transfer is not effective for any purpose until approved in writing by the Department. (4-7-11)

9.2.3 Permit Revocation (IDAPA 58.01.17.920)

01. Conditions for Revocation. The Director may revoke a permit if the permittee violates any permit condition or these rules, or the Director becomes aware of any omission or misrepresentation of condition or information relied upon when issuing the permit. (4-7-11)

02. Notice of Revocation. Except in cases of emergency, the Director shall issue a written notice of intent to revoke to the permittee prior to final revocation. Revocation shall become final within thirty-five (35) days of receipt of the notice by the permittee, unless within that time the permittee requests an administrative hearing in writing. The hearing shall be conducted in accordance with IDAPA 58.01.23, Rules of Administrative Procedure

before the Board of Environmental Quality." (5-3-03)

03. Emergency Action. If the Director finds the public health, safety or welfare requires emergency action, the Director shall incorporate findings in support of such action in a written notice of emergency revocation issued to the permittee. Emergency revocation shall be effective upon receipt by the permittee. Thereafter, if requested by the permittee in writing, the Director shall provide the permittee a revocation hearing and prior notice thereof. Such hearings shall be conducted in accordance with IDAPA 58.01.23, "Rules of Administrative Procedure Before the Board of Environmental Quality." (3-15-02)

04. Revocation and Closure. A permittee shall perform the closure requirements in a permit, the closure requirements of these rules, and complete all closure plan activities notwithstanding the revocation of the permit. (4-7-11)

9.2.4 Violations (IDAPA 58.01.17.930)

Any person violating any provision of these rules or any permit or order issued thereunder shall be liable for a civil penalty not to exceed ten thousand dollars ($10,000) or one thousand dollars ($1,000) for each day of a continuing violation, whichever is greater. In addition, pursuant to Title 39, Chapter 1, Idaho Code, any willful or negligent violation may constitute a misdemeanor. (4-1-88)

9.2.5 Severability

The provisions of this permit are severable, and if a provision or its application is declared invalid or unenforceable for any reason, that declaration will not affect the validity or enforceability of the remaining provisions.

10. Other Applicable Laws

DEQ may refer enforcement of the following provisions to the state agency authorized to enforce that rule. The permittee shall comply with all applicable provisions identified in this section. Compliance with this permit does not relieve the permittee from applicable requirements in other federal, state, and local laws, statutes, and rules.

10.1 Owner Responsibilities for Well Use and Maintenance

10.1.1 Well Use

The well owner must not operate any well in a manner that causes waste or contamination of the ground water resource. Failure to operate, maintain, knowingly allow the construction of any well in a manner that violates these rules, or failure to repair or properly decommission (abandon) any well as herein required will subject the well owner to civil penalties as provided by statute. See IDAPA 37.03.09.036.01 and consult the Idaho Department of Water Resources (IDWR) for more information.

10.1.2 Well Maintenance

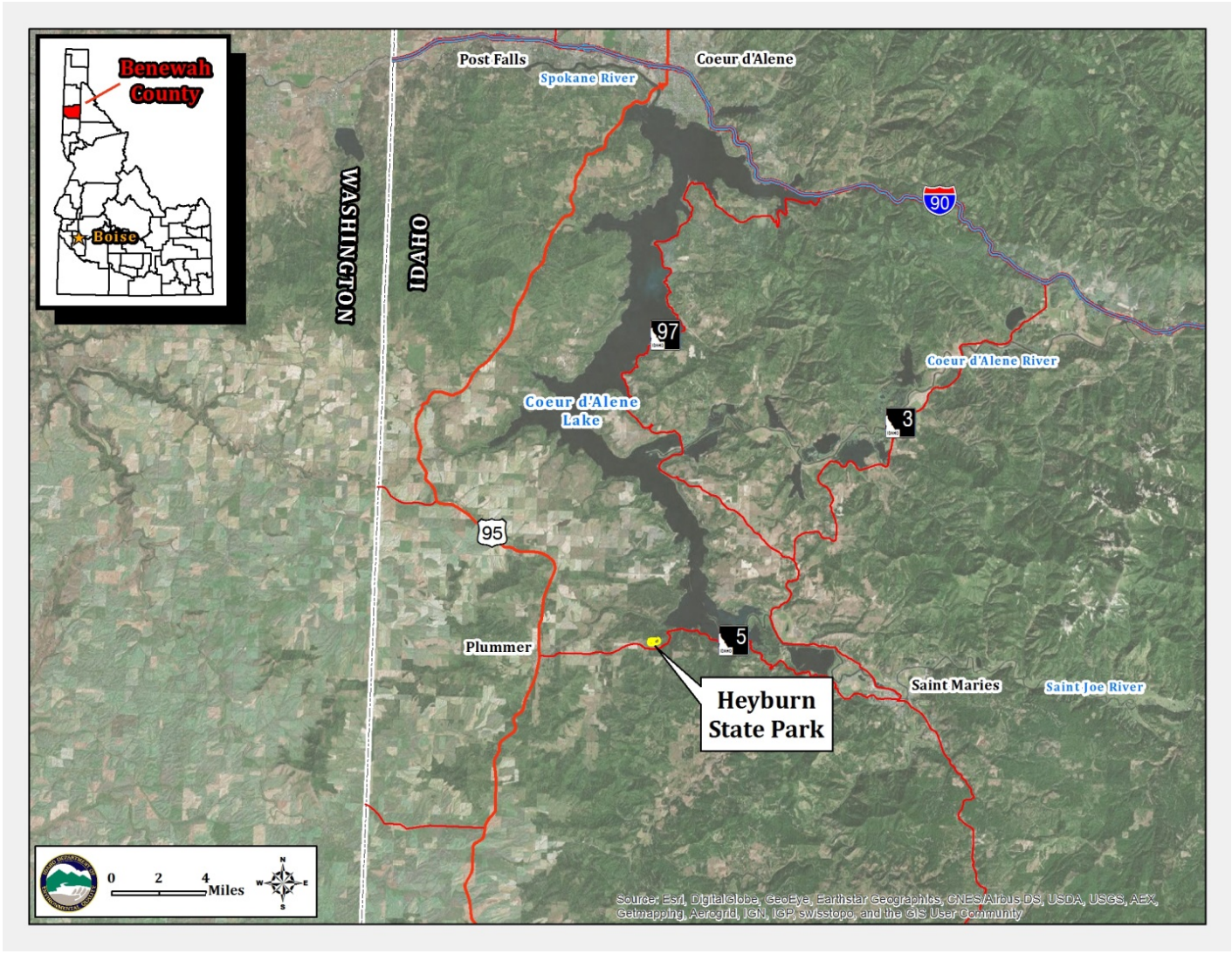
The well owner must maintain the well to prevent waste or contamination of ground waters through leaky casings, pipes, fittings, valves, pumps, seals, or through leakage around the outside of the casings, whether the leakage is above or below the land surface. Any person owning or controlling a noncompliant well must have the well repaired by a licensed well driller under a permit issued by the IDWR director in accordance with the applicable rules. See IDAPA 37.03.09.036.02 and consult IDWR for more information.

10.1.3 Wells Posing a Threat to Human Health and Safety or Causing Contamination of the Ground Water Resource

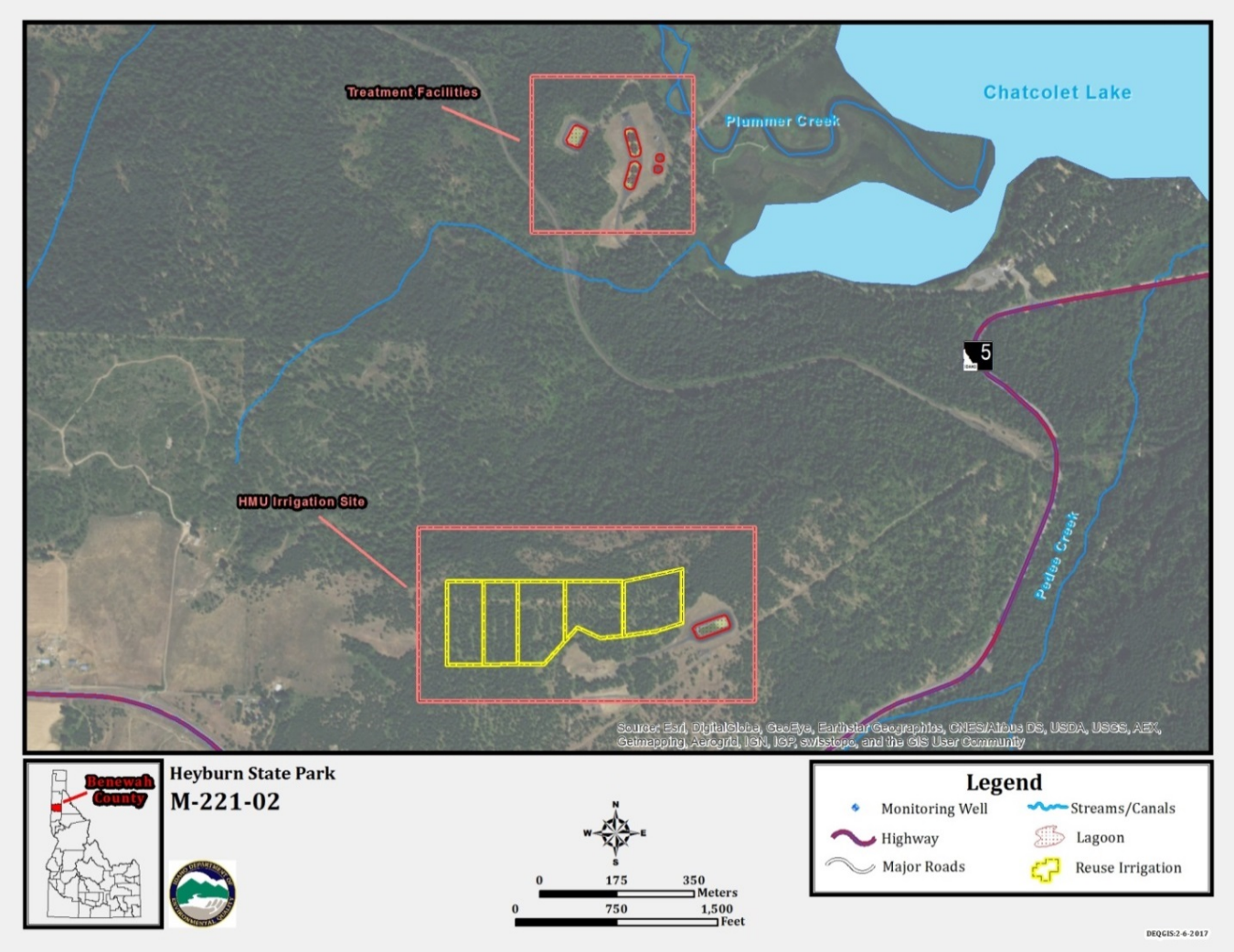
The well owner must have any well shown to pose a threat to human health and safety or cause contamination of the ground water resource immediately repaired or decommissioned (abandoned) by a licensed well driller under a permit issued by the IDWR director in accordance with the applicable rules. See IDAPA 37.03.09.036.06 and consult the IDWR for more information.

11. Site Maps

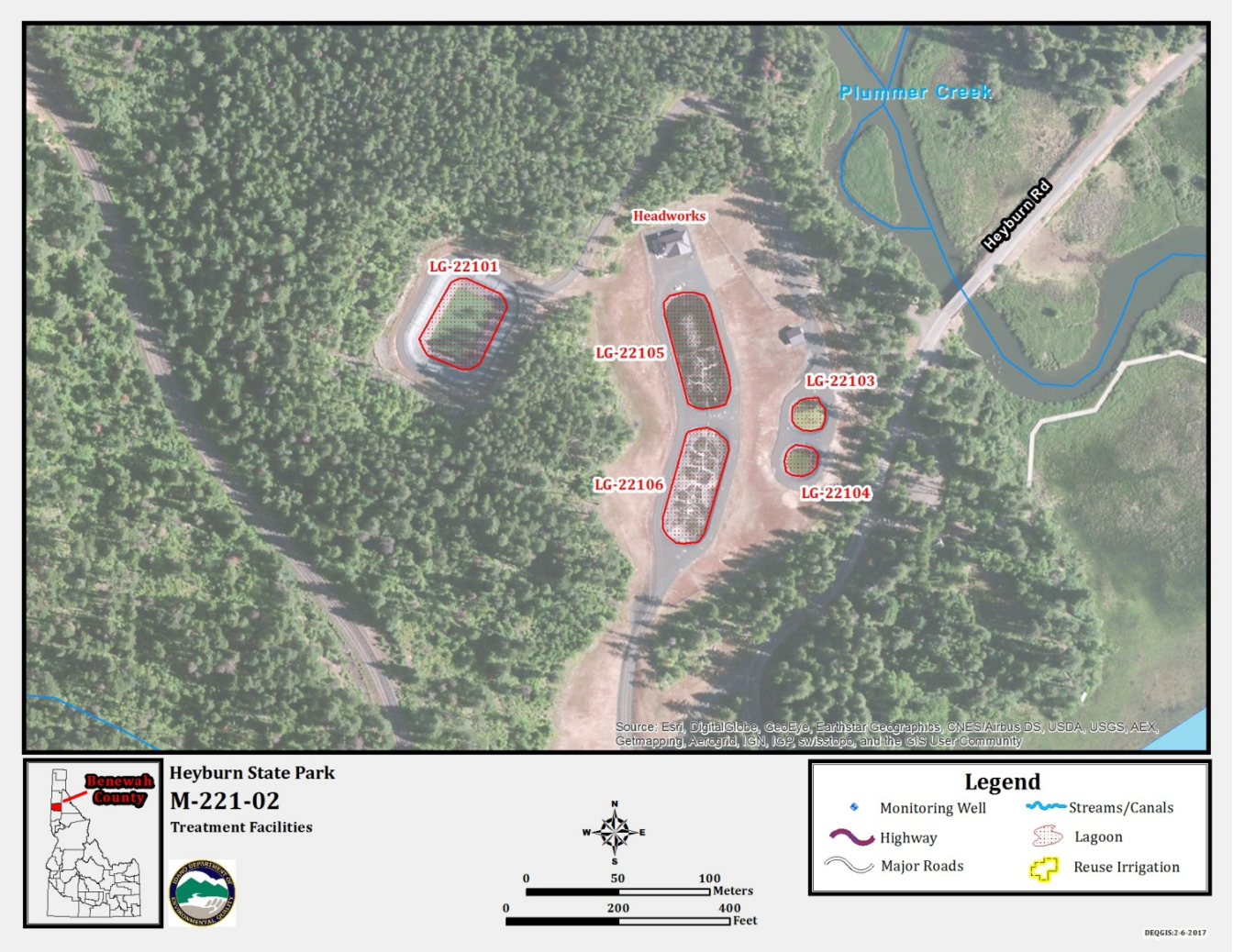
11.1 Regional Map



11.2 Facility Map and Surface Water



11.3 Facility Map of Treatment Lagoons and Storage Lagoon #1



11.4 Facility Map of Management Units and Storage Lagoon #2